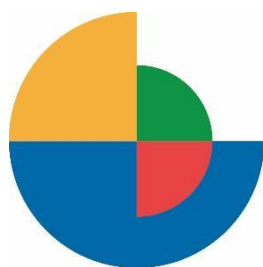


THE NATIONAL BENCHMARK TESTS NATIONAL REPORT

2020 INTAKE CYCLE



By:
The NBTP team at CETAP



TESTS - IMPROVING

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EXECUTIVE SUMMARY

The National Benchmark Test (NBT) provide a service to Higher Education Institutions requiring additional information to assist in selection and placement of prospective students in appropriate curricular routes. This report is aimed at providing an initial analysis of the NBT written by candidates for entry into higher education institutions in the 2020 academic year. Candidates considered in this report will have written the NBTs between 1 May 2019 and 28 February 2020. The report provides information on test performance and benchmarking, this information forms an essential part to assess the entry level of candidate's academic skills in three domains of Academic Literacy (AL), Quantitative Literacy (QL) and Mathematics (MAT).

In the 2020 National Benchmark Tests (NBT) intake cycle, 72,118 Academic Literacy (AL) test scores, 72,159 Quantitative Literacy (QL) test scores and 55,231 Mathematics (MAT) test scores were obtained.

The mean and median scores for AL, QL and MAT are all in the Intermediate band. All scores are provided in the body of the report.

Between 8% and 9% of the national candidates wrote the Afrikaans AL, QL and MAT tests. Their mean and median performance was better than those of the English candidates in each domain.

Candidates intending to study Law performed better than those intending to study other disciplines in all test domains. The performance of candidates intending to study Education; Allied Healthcare/Nursing; and Hospitality/Tourism was particularly low.

The 2020 and 2019 intake proficiency categories at national level are quite consistent. Although the 2020 intake results differ slightly from the 2019 intake results, the changes in all domain scores are consistent with the changes that would be expected within a one year period.

The second last section of the report uses national data to show the additional information for teaching and learning that can be obtained from the NBT. Sub-domain analyses in AL, QL and MAT of NBT results from the 2020 intake cohort identified areas of strengths and weaknesses.

The last section of the report investigates the relationships between the NBT domains AL, QL and MAT and cognate National Senior Certificate (NSC) subjects: Mathematics, Mathematical Literacy, Physical Science, English Home Language and English First Additional Language for those NBT candidates who also wrote the NSC examinations. This section clearly shows the complementarity of the information provided by the NBT to that provided by the NSC.

1. INTRODUCTION

The National Benchmark Tests Project (NBTP) was commissioned in 2005 by Higher Education South Africa (HESA), now called Universities South Africa (USAf). The main objective of the project was to assess the entry level academic skills of candidates in Academic Literacy (AL), Quantitative Literacy (QL) and Mathematics (MAT). In addition, the project also provided a service to Higher Education Institutions requiring additional information to assist in selection and placement of prospective students in appropriate curricular routes. The project has also assisted with curriculum development through first year teaching and learning forums and in relation to foundation, extended and augmented courses.

The National Benchmark Tests (NBT) are designed to provide complementary criterion-referenced information to supplement norm-referenced school-leaving results such as those provided by the National Senior Certificate (NSC). The NBT assess a candidate's competence in the three domains of AL, QL and MAT.

2. PURPOSE OF THE REPORT

2.1 OBJECTIVE

The objective of this report is to provide an initial analysis of the National Benchmark Tests written by candidates for entry into higher education institutions in the 2020 academic year. Candidates considered in this report will have written the NBT between 1 May 2019 and 28 February 2020.

This report is intended for distribution to South African higher education institutions, institutions supporting or complementing higher education in South Africa e.g. Umalusi, government departments, institutions (other than higher education) which make use of the NBT - for example those offering bursaries - and schools.

2.2. DESCRIPTION OF THE SAMPLE

The sample considered for the 2020 report consists of all NBT candidates who wrote the tests by 28 February 2020, i.e., not the full 2020 intake cohort. Outstanding scores consisted of results from special sessions (sessions at the express request of particular institutions). The number of candidates in these sessions should not impact substantially on the results reported below. However, the difference has not been evaluated statistically.

Section 8 considers a subsample of the 2020 NBT intake cohort relating specifically to candidates who have NSC results as well. More detailed notes on this sample are provided in that section.

2.3 LIMITATIONS

The results reported here are limited by the following factors:

- o NBT candidates do not indicate whether they intend to study at degree or diploma level. Therefore, apart from Section 8 where NSC data is used, all results are benchmarked against degree level criteria.

- o Candidates are asked to indicate their first, second and third choice of faculty to which they have applied or will apply. Only the first choice of intended faculty was used in this analysis.
- o Data are not collected by the National Benchmark Tests Project on actual placement of all the candidates within faculties or institutions. Caution should therefore be used when drawing conclusions based on the results from intended faculty of study.

2.4 PLANNED RESEARCH

The Centre for Educational Testing for Access and Placement (CETAP) does research on the NBTs and general preparedness of students beyond that presented in this report. This includes more detailed analysis of the data used in this report and can be requested from the Test Development Coordinator.

3. DESCRIPTION OF THE TESTS

3.1 PURPOSES OF THE TESTS

The National Benchmark Tests are designed specifically:

- o To perform a function that is complementary to that of the National Senior Certificate. They act as a provider of augmented independent and objective information against which the performance of students on the National Senior Certificate can be compared and calibrated. They assess candidates' levels of academic readiness at a particular point in time, i.e. prior to possible entry to higher education.
- o With the aim of providing information that makes it possible for candidates to be placed more accurately in programmes of higher education, based on their performance on the tests. The tests comprise constructs in three broad domains, which enable the assessment of students' readiness to cope with differing forms (e.g. mainstream, foundation) of curriculum. Minimum (benchmark) scores on the constructs of the tests represent levels at which a student would be expected to perform in order to be deemed "recommendable" for different forms of educational provision.
- o The tests are designed to assess entry-level preparedness of students in terms of the key areas of academic literacy, quantitative literacy and mathematics. The domains represent core areas of competency in which students entering any form of higher education would be expected to display minimum levels of proficiency. The tests are criterion-referenced, i.e. they are aimed at assessing students' academic and quantitative literacy and mathematics competence against standard levels of performance regarded by experts in the fields as being acceptable for entry into higher education.

3.2 AIMS OF THE TESTS

The NBT are aimed at assessing the school-leaving higher education applicant pool, i.e. the national cohort of school-leavers wishing to access higher education in any one year. The tests aim to address the following question:

- What are the academic literacy, quantitative literacy and mathematics levels of proficiencies of the school-leaving population?
- Who wish to continue with higher education, at the point prior to their entry into higher education at which they could realistically be expected to cope with the demands of higher education study?

The constructs and domains of the three tests are based on testing this question, and the levels of the tests have been set with the notion of levels of proficiency as focus.

3.3 TEST DOMAINS

3.3. *ACADEMIC LITERACY (AL)*

The National Benchmark Test in Academic Literacy aims to assess candidates' ability to:

- o read carefully and make meaning from texts that are typical of the kinds that they will encounter in their studies;
- o understand vocabulary, including vocabulary related to academic study, in their contexts; identify and track points and claims being made in texts.
- o understand and evaluate the evidence that is used to support claims made by writers of texts; extrapolate and draw inferences and conclusions from what is stated or given in text;
- o identify main from supporting ideas in the overall and specific organisation of a text;
- o identify and understand the different types and purposes of communication in texts;
- o be aware of and identify text differences that relate to writers' different purposes; audiences, and kinds of communication.

3.3.2 *QUANTITATIVE LITERACY (QL)*

The National Benchmark Test in Quantitative Literacy aims to assess candidates' ability to:

- o select and use a range of quantitative terms and phrases;
- o apply quantitative procedures in various situations;
- o formulate and apply simple formulae;
- o read and interpret tables, graphs, charts and text and integrate information from different sources; and
- o accurately do simple calculations involving multiple steps;
- o identify trends and patterns in various situations;
- o reason logically;
- o understand and interpret information that is presented visually (e.g., in graphs, tables, flow-charts);
- o understand basic numerical concepts and information used in text, and do basic numerical manipulations;

- o competently interpret quantitative information.

3.3.3 MATHEMATICS (MAT)

The National Benchmark Test in mathematics, referred to as the NBT MAT test, aims to assess candidates' ability with respect to a number of mathematical topics:

- o Problem solving and modelling, requiring the use of algebraic processes, as well as understanding and using functions represented in different ways.
- o Basic trigonometry, including graphs of trigonometric functions, problems requiring solution of trigonometric equations and application of trigonometric concepts.
- o Spatial perception (angles, symmetries, measurements, etc.), including representation and interpretation of two and three dimensional objects; analytic geometry and circle geometry.
- o Data handling and probability.
- o Competent use of logical skills.

It is not the intention of the MAT tests to replicate either the NSC or the Mathematics Olympiad. The point of departure of the tests is the expectations of the Curriculum and Assessment Policy Statement (CAPS). The Department of Basic Education provides educators with a pace-setter document which guides the planning of lessons in order to assist them to complete the curriculum before the period of revision and final examinations. The NBT MAT tests are designed with the pace-setter document in mind. The assumption is made that if a student is to achieve a competent pass in the NSC, a certain level of content and procedural competence will have been reached by the time the first MAT tests are written. The MAT tests are explicitly designed to probe higher education competencies (i.e. depth of understanding and knowledge) within the context of the NSC curriculum.

3.4 RECOMMENDED USES OF THE TESTS

As stated above, the tests are recommended for use as an assessment of students' levels of readiness to cope with the typical demands of higher education in the three domains specified. Moreover, the tests can provide diagnostic data that could inform student support curriculum intervention. Whereas the two literacy tests are recommended for use for all prospective higher education students, the mathematics test should typically be administered to students who wish to study courses with greater demand for mathematical competence.

Benchmark levels on the tests are intended for use in placing students in different forms of higher education curriculum provision, with different levels of possible support.

3.5 INFERENCES TO BE MADE FROM TEST SCORES

As the NBT are criterion-referenced tests, inferences about the results of writers of the tests should be focused on interpreting the extent to which students have met the expected standards set for each domain. Curriculum provision will be able to support students who are deemed not to be ready for the demands of mainstream higher education provision without appropriate levels of support as indicated in Table 1. It is appropriate to interpret certain (lower) levels of performance on the tests as meaning students will require extensive levels of academic support if they are going to cope with the demands of higher education.

Table 1 Description of NBT tests

Academic and Quantitative Literacy test (3 hours and 5 minutes) The results of the two sections of the AL and QL tests are reported separately as percentages and benchmark levels.	The test targets students' <ul style="list-style-type: none"> ○ Capacity to engage successfully with the reading and reasoning demands of academic study in the medium of instruction; and ○ ability to solve problems in a real context that is relevant to higher education study, using basic quantitative information that may be presented verbally, graphically, in tabular or symbolic form as related to both the NSC subjects of Mathematics and Mathematical Literacy.
The Mathematics test (3 hours) The results of the test are reported as a percentage and in terms of benchmark levels.	The test targets candidates' ability related to mathematical concepts formally regarded as part of the secondary school Mathematics curriculum.

3.6 DURATION OF THE TESTS

The two test domains, Academic Literacy (AL) and Quantitative Literacy (QL), have been compiled into one test, namely the Academic and Quantitative Literacy (AQL) test, and the Mathematics (MAT) domain is administered as a separate test. The two tests are administered separately and are three hours and 5 minutes and 3 hours duration respectively, written on the same day. All applicants will write the Academic and Quantitative Literacy (AQL) Test. The proportions of items in each domain of this test are as follows: Academic Literacy 60 – 70%; Quantitative Literacy 30 – 40%. The AL component of the AQL test currently consists of 74 items and the QL component of the test currently consists of 50 items. Time allocation for the AL and QL sections of the test is two hours and five minutes and one hour, respectively. The MAT test consists of 60 items. The results of each test domain are reported separately. At the request of certain organisations or departments some candidates will write only the AL or QL test. However, as stated above, the tests have been designed to be written as a set.

3.7 LANGUAGE OF THE TESTS

The tests are available in English and Afrikaans - the two languages of instruction in higher education in South Africa.

3.8 TEST ITEM-TYPES

Test questions are select response (multiple-choice) items, with four options for each item.

3.9 TEST SCORING

Writers' responses are recorded on mark-reading sheets that are scanned using Optical Scanner technology. Responses are scored using the uni-dimensional three parameter (a, b, c¹) Item Response Theory (IRT) model for the AL, QL and MAT tests.

Items are scored dichotomously, i.e. either as right or wrong. Since all tests are power tests, missing responses are scored as wrong. This is valid, given that piloting and the experience of several years shows that sufficient time has been allocated to each of the domains.

¹ Where a = discrimination, b = difficulty, and c = guessing/pseudo-chance.

3.10 TEST REPORTING

Test results are reported to institutions and candidates in two forms: as two (AL / QL) or three (AL / QL / MAT) scores as a percentage as well as by benchmark category. As Table 2 indicates, they are also informed about the level of institutional response deemed appropriate to meet educational needs.

3.11 TEST ADMINISTRATION

The tests are pencil-and-paper instruments and are administered under standardised conditions, as set out in a Test Administration Manual. These procedures are the same as those under which the pilot tests were administered, and which have remained unchanged since the tests first became operational in 2009. These procedures are available from the Centre for Educational Testing for Access and Placement (CETAP) at the UCT.

3.12 ITEM AND TEST DEVELOPMENT

Item and test development teams are comprised of academics from all higher education institutions in South Africa as well as practising teachers. In addition to calls on academics to put themselves forward and participate in these teams, the NBTP regularly appeals to senior academic staff (relevant Deputy Vice Chancellors and Deans) to identify appropriate staff. Ongoing efforts are made to ensure the teams are representative of all higher education institution types and disciplinary areas. To date, in excess of 500 academics have participated in one or more ways in the NBTP.

The teams are constructed on the basis of the expertise of the participants in what constitutes proficiency of test writers at the school-leaving stage wishing to enter higher education. Language and disciplinary experts drawn from outside the test development teams function as reviewers of the tests in terms of their language, content and format appropriateness, construct representation, and bias and fairness. Items are assessed by review panels constituted from academics and teachers for bias, fairness, content and construct representation, and statistical processes (Item Response and Classical Test Theory) are used to investigate any Differential Item Functioning. The item and test development and review cycle relating to the tests featured in this report was largely carried out from October to November 2017. The NBTP organised and hosted item and test review workshops for AL, QL and MAT for the 2019 and 2020 intake cycle tests. Item and test review reports are available on request from the CETAP Test Development Coordinator.

3.13 NBTP ANNUAL CYCLE

The NBTP follows an annual cycle of:

- o Item development and item review workshops;
- o Populating the Item Banks;
- o Test assembly and preparation of tests in each domain for each testing session;
- o Test administration, scoring, and score reporting to writers and institutions;
- o Data analysis as part of continual item and test development and improvement;
- o Contribution towards the NBT Stakeholders Consultative Forum;
- o Dissemination of information about the NBTP to the higher education sector, the Department of Higher Education and Training sector (DHET) and the Department of Basic Education (DBE);

- o Revision and resetting of benchmarks for Degree and Diploma study every three years.

3.14 THE NBT BENCHMARKS

The NBTP aims to deliver information against benchmarked categories of performance for formal study at institutions of higher learning. Table 2 provides a description of benchmark levels and what institutional response to candidates performing at these levels should be. More detailed description of benchmark levels for each of the NBT domain tests is available on request from the CETAP Test Development Coordinator.

Table 2 NBT overall benchmark descriptors

Proficient	Performance in domain areas suggests that academic performance will not be adversely affected in cognate domains. If admitted, students should be placed on regular programmes of study.
Intermediate	Challenges in domain areas identified such that it is predicted that academic progress in cognate domains will be affected. If admitted, students' educational needs should be met in a way deemed appropriate by the institution (e.g. extended or augmented programmes, special skills provision).
Basic	Serious learning challenges identified. Students are unlikely to cope with mainstream university study.

The score range at which the benchmarks are defined were first set in May 2009 by panels drawn from across the country, comprising academics who were at that stage engaged in mainstream teaching relevant to the domain and who had not previously been involved in any NBTP test development processes. Benchmarks are revised every three years, as part of good testing practice, and Benchmarks were set again in October 2015. More detailed description of benchmark levels for each of the NBT domains set is available on request from the CETAP Test Development Coordinator. Table 3 shows the benchmarks for degree study as well as those for diploma/certificate study which were set in 2015 and were used to determine the proficiency of the 2020 intake candidates.

Table 3 NBT benchmarks set in 2015 for degree and diploma/certificate study

Proficient	100%	Test performance suggests that future academic performance will not be adversely affected (students may pass or fail at university, but this is highly unlikely to be attributable to strengths or weaknesses in the domains tested). If admitted, students may be placed into regular programmes of study. Degree: AL [68%]; QL [70%] MAT [69%] Diploma/Certificate: AL [61%]; QL [66%] MAT [67%]
Intermediate		The challenges identified are such that it is predicted that academic progress will be adversely affected. If admitted, students' educational needs should be met as deemed appropriate by the institution (e.g. extended or augmented programmes, special skills provision). Degree: AL [39%]; QL [40%]; MAT [35%] Diploma/Certificate: AL [33%]; QL [34%] MAT [38%]
Basic	0%	Test performance reveals serious learning challenges: it is predicted that students will not cope with degree-level study without extensive and long-term support, perhaps best provided through bridging programmes (i.e. non-credit preparatory courses, special skills provision) or FET provision. Institutions admitting students performing at this level would need to provide such support themselves.

In addition, the Intermediate performance band is divided into Intermediate Upper and Lower as shown in Table 4. The Intermediate band represented the majority of the applicant pool, and this is the pool for which educational institutions should be prepared to address educational needs with extended or augmented support programmes to enable students to succeed in their degree studies.

Table 4 NBT Intermediate benchmarks and how they should be interpreted

	intermediate Upper	Assessment of need	Intermediate Lower	Assessment of need
AL	Degree: [54-67] Diploma/Certificate: [47-60]	Students are likely to need complementary support (additional tutorials, workshops, augmented courses, language intensive work)	Degree: [39-53] Diploma/Certificate: [33-46]	Students need to be placed in an extended programme
QL	Degree: [55-69] Diploma/Certificate: [50-65]		Degree: [40-54] Diploma/Certificate: [34-49]	
MAT	Degree: [52-68] Diploma/Certificate: [51-66]		Degree: [35-51] Diploma/Certificate: [35-50]	

3.15 INSTITUTIONS AND ORGANIZATIONS USING THE NBT

Fifty-one institutions requested and received scores from the NBTP during the 2020 intake cycle by February 2020. The NBT were used for a variety of reasons by institutions (and, in many cases, in different ways by individuals or faculties or departments within an institution), including admission, placement, research and bursary allocation. Of the institutions receiving scores, this includes 15 Universities.

3.16 ACCESSIBILITY OF THE NBT PROJECT

In the 2020 intake cycle, 37 AQL tests were written by 72,159² candidates and 34 different MAT tests were written by 55,231 candidates (different tests are written to maintain the security and integrity of the tests).

The NBTP places great importance on the accessibility of the tests. In the 2019 intake cycle, CETAP undertook a business analysis of the footprint and the cost of maintaining this footprint based on writer attendance, making certain decisions based on the cost of venues to the project. This resulted in a reduction of test centres to 115 in the 2019 intake cycle and a further reduction to 91 test centres for the 2020 intake cycle. In addition, the number of sessions was reduced to 728. Table 5 below provides details of the number of national test sessions and test centres by provinces, and Figures 1 and 2 below illustrate this graphically.

² Although the AL and QL tests are designed to be written together, one Special Session was held where 49 candidates only wrote the QL test. Additionally 8 candidates wrote the AL test but did not write the QL test...

Table 5 Number of national test centres and test sessions by province for NBT 2019 intake and NBT 2020 intake cycles

Region / Province	Province	Number of NBT test centres in 2019 Intake Cycle	Number of NBT test sessions in 2019 Intake Cycle	Number of NBT test centres in 2020 Intake Cycle	Number of NBT test sessions in 2020 Intake Cycle	Percentage change 2019 - 2020 Intake: Number of NBT test centres	Percentage change 2019 - 2020 Intake: Number of NBT test sessions
EASTERN CAPE	EC	14	124	13	118	-7%	-5%
FREE STATE	FS	8	83	5	47	-38%	-43%
GAUTENG	GP	16	163	17	163	6%	0%
KWAZULU-NATAL	KZN	22	119	18	100	-18%	-16%
LIMPOPO	LP	7	67	6	61	-14%	-9%
MPUMALANGA	MP	8	61	8	60	0%	-2%
NORTH-WEST	NW	3	25	3	25	0%	0%
NORTHERN CAPE	NC	6	45	2	23	-67%	-49%
WESTERN CAPE	WP	16	141	14	121	-13%	-14%
SADC REGION	SADC	15	53	5	10	-67%	-81%
Grand Total		115	881	91	728	-21%	-17%

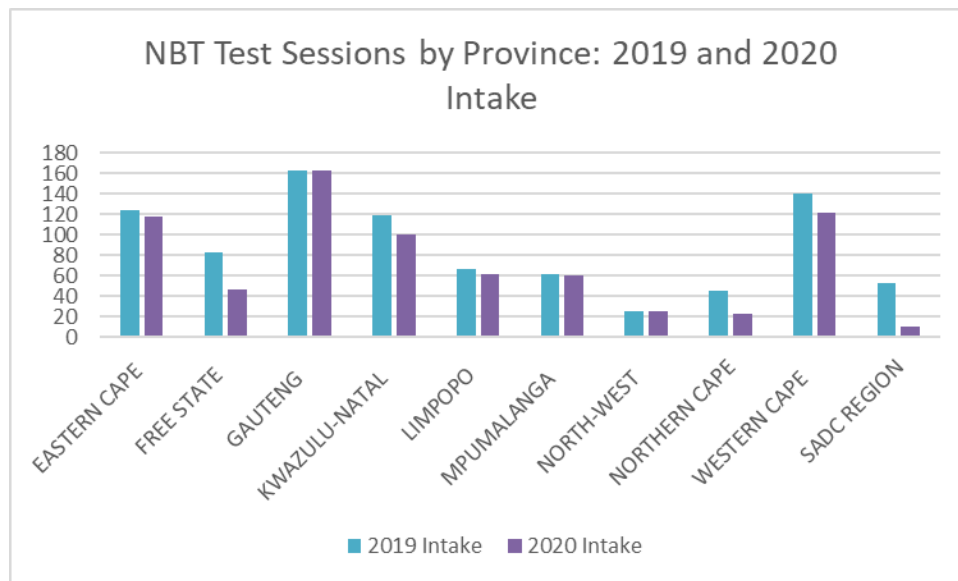


Figure 1 NBT test sessions for the 2019 and 2020 intake cycle

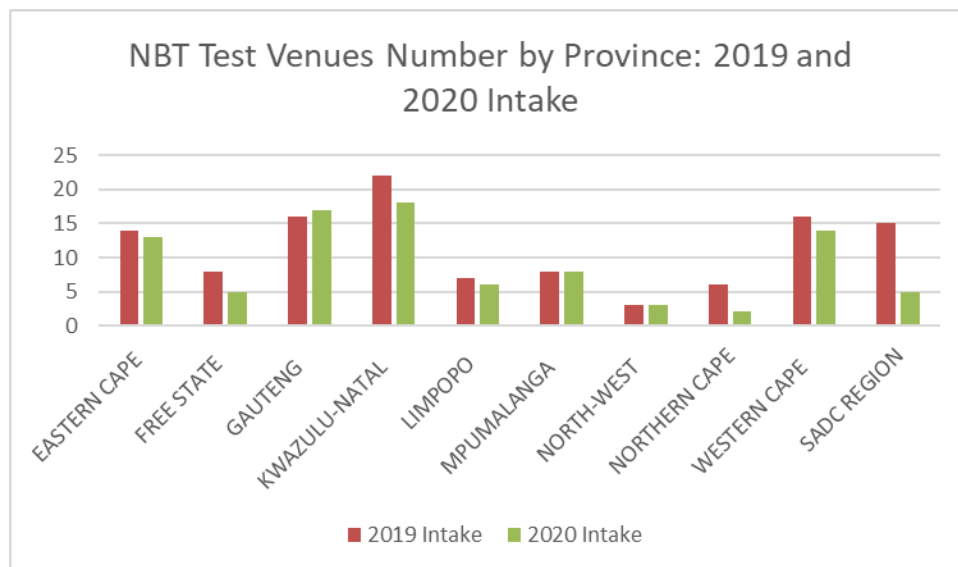


Figure 2 NBT test centres for the 2019 and 2020 intake cycle

THE NBT FOOTPRINT

As part of the ongoing strategy of CETAP to ensure that all prospective writers have access to venues, CETAP embarks annually on a study of its footprint to identify areas that are under-represented in the NBT testing venue footprint. In the past 2020 intake cycle, CETAP undertook a re-evaluation of the footprint and made certain decisions based on the cost of venues to the project. This resulted in a reduction of test centres to 91. Additionally the number of sessions was reduced to 728. This rationalisation was undertaken cognisant of the access by writers and particular care was taken to encompass Quintile 1-3 schools producing Bachelor's passes within the 50 km radius.

4. DEMOGRAPHIC CHARACTERISTICS OF THE 2020 INTAKE NBTP CANDIDATES

Candidates writing the NBTs for the 2020 intake cycle provided demographic information through self-reporting. The demographic information is provided when the candidates write the actual tests.

Selected self-reported demographic characteristics are reported in Table 6. The table reflects the frequencies based on writers of each test. For example, the subsample of AL writers consisted of 62.34% females, and 66.62% indicated their population group as black. The NBT candidates appear to be representative of the demographic characteristics of the national higher education applicant cohort.

Table 6 Frequency tables for selected self-reported demographic characteristics for the 2020 NBT cohort

	Wrote AL		Wrote QL		Wrote Maths	
	Count	%	Count	%	Count	%
GENDER						
Female	44,959	62.34	44,978	62.33	33,134	59.99
Male	27,154	37.65	27,176	37.66	22,092	40
Unspecified	5	0.01	5	0.01	5	0.01
Total	72,118	100	72,159	100	55,231	100
POPULATION GROUP						
Black	48,042	66.62	48,053	66.59	36,911	66.83
Coloured	8,304	11.51	8,314	11.52	5,141	9.31
Indian/Asian	4,159	5.77	4,162	5.77	3,800	6.88
White	11,325	15.70	11,342	15.72	9,166	16.60
Other	288	0.40	288	0.40	213	0.39
Total	72,118	100	72,159	100	55,231	100
CITIZENSHIP						
South African	68,372	94.81	68,401	94.79	52,315	94.72
SADC country	2,347	3.25	2,355	3.26	1,798	3.26
Other African country	889	1.23	890	1.23	687	1.24
Other	510	0.71	513	0.71	431	0.78
Total	72,118	100	72,159	100	55,231	100
GR 12 LANGUAGE						
Afrikaans	6,479	8.98	6,479	8.98	4,604	8.34
English	63,663	88.28	63,700	88.28	49,125	88.94
Other	1,976	2.74	1,980	2.74	1,502	2.72
Total	72,118	100	72,159	100	55,231	100
HOME LANGUAGE						
Afrikaans	7,087	9.83	7,087	9.82	5,141	9.31
English	20,789	28.83	20,819	28.85	15,788	28.59
isiNdebele	731	1.01	731	1.01	593	1.07
isiXhosa	10,782	14.95	10,785	14.95	7,504	13.59
isiZulu	9,008	12.49	9,010	12.49	7,253	13.13
Sesotho	5,230	7.25	5,230	7.25	3,811	6.90
Sesotho sa Leboa	5,053	7.01	5,052	7	4,341	7.86
Setswana	4,191	5.81	4,191	5.81	2,969	5.38
siSwati	1,874	2.60	1,874	2.60	1,549	2.80
Tshivenda	2,652	3.68	2,652	3.68	2,382	4.31

Xitsonga	3,006	4.17	3,007	4.17	2,520	4.56
Other Language	1,715	2.38	1,721	2.39	1,380	2.50
Total	72,118	100	72,159	100	55,231	100

5. PERFORMANCE OF THE 2020 INTAKE

5.1 TEST PERFORMANCE OF THE 2020 INTAKE NBTP CANDIDATES

The tests were made available in both English and Afrikaans, the two official languages of instruction at South African Higher Education Institutions for the 2020 intake cycle. For the 2020 intake cycle, registration opened on the 1st of April 2019.

The scores indicated below show the scores of candidates who wrote the NBTs by 28 February 2020. The NBT candidates represent the demographic characteristics of the national higher education applicant cohort.

The NBT candidates include both those who wrote as part of their application for tertiary study and those who wrote for placement purposes after admission. This section reports the descriptive statistics for the three NBT scores as well as the frequency tables for the benchmark bands. Table 7 shows the descriptive statistics for the cohort as a whole. Both the mean and median scores fall within the Intermediate benchmark categories for all three domains, as in 2019. The distributions on both the QL and MAT were positively skewed (see histograms in Figure 5).

5.1.1 DESCRIPTIVE STATISTICS

Table 7 Descriptive statistics for AL, QL and MAT for the 2020 NBT cohort

NBT Test	n	Mean	SD	Minimum	1st Quartile	Median	3rd Quartile	Maximum
AL	72,118	54.78	14.69	1.00	42.00	53.00	67.00	94.00
QL	72,159	45.84	15.81	1.00	34.00	41.00	55.00	99.00
MAT	55,231	40.88	17.15	2.00	28.00	34.00	50.00	98.00

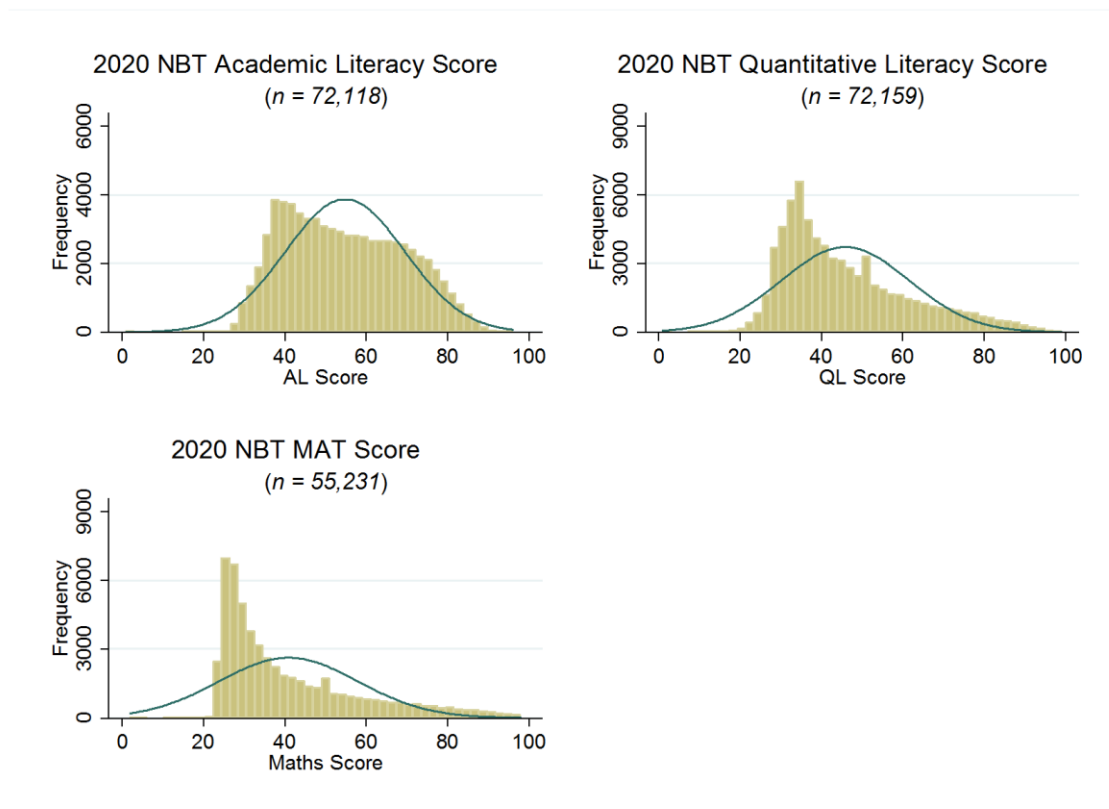


Figure 3 NBT test scores

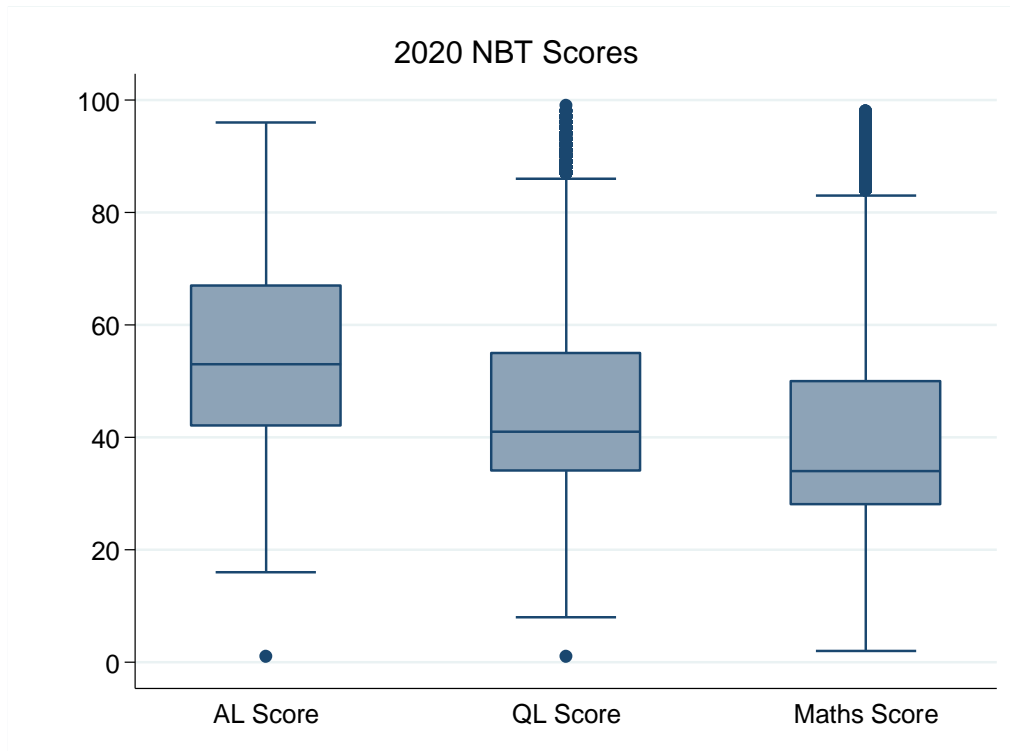


Figure 4 NBT test scores

5.2 2020 NBT COHORT BY PERFORMANCE LEVELS

Table 8 represents the performance within criterion-referenced degree benchmark levels for the 2020 NBT cohort as a whole. These candidates were placed into four degree benchmark levels: Basic, Intermediate Lower, Intermediate Upper and Proficient. The interpretation of benchmark levels was discussed in the section relating to the NBT Benchmarks earlier in this document.

Table 8 Frequency tables for the degree benchmark levels of the 2020 NBT cohort

NBT tests	Basic	Intermediate Lower	Intermediate Upper	Proficient	Total (N)
Academic Literacy	11,045 (15.32%)	25,105 (34.81%)	19,118 (26.51%)	16,850 (23.36%)	72,118
Quantitative Literacy	32,817 (45.48%)	20,743 (28.75%)	10,923 (15.14%)	7,676 (10.64%)	72,159
Mathematics	28,144 (50.96%)	14,397 (26.07%)	7,199 (13.03%)	5,491 (9.94%)	55,231

The performance of the 2020 cohort strongly suggests that the higher education sector needs to be prepared to provide extensive support in QL and MAT, since as many as ninety percent (90%) of their prospective students are likely to have scores that fall within the Basic and Intermediate benchmark bands.

Intermediate band

Table 8 above shows that 62% of candidates had scores in the Intermediate benchmark level for AL and 44% of candidates had scores in the Intermediate benchmark level for QL, while 39% of the MAT candidates had scores in the Intermediate category.

Basic band

The number of candidates with scores in the Basic band is significant for QL and MAT. Forty-four percent of the candidates had QL scores in the Basic band and 52% of the MAT candidates had scores in the Basic band. The prediction is that these candidates will require extensive support if they are to have a chance of succeeding in higher education degree study.

Proficient band

The Proficient band can be interpreted to mean that academic progress in higher education ought not to be limited or negatively affected by ability in this domain. As can be seen from Table 8 above, the percentage of candidates with Proficient scores in QL and MAT is quite low, namely 11% for QL, and 10% for MAT. Although the percentage of candidates with Proficient scores in AL is higher, at approximately 24%, this still does not represent the majority of the candidates.

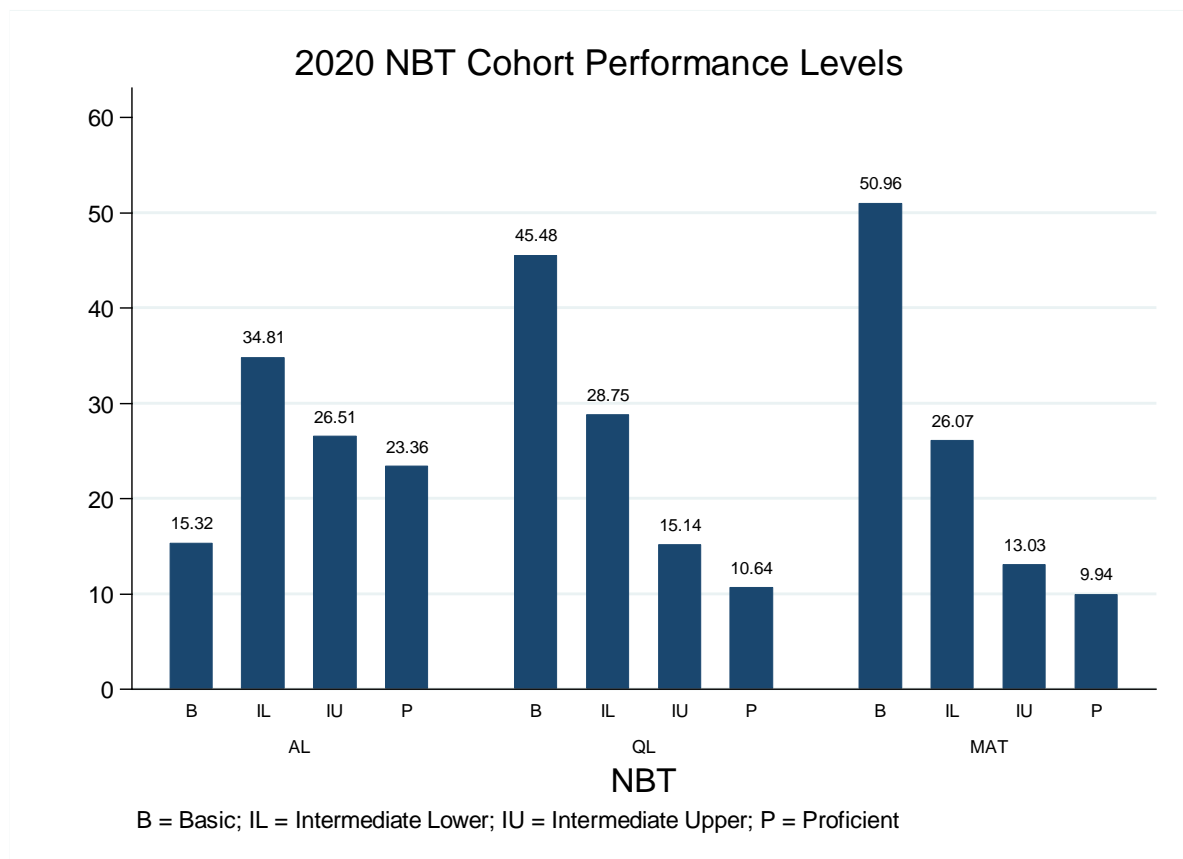


Figure 5 2020 NBT performance levels for AL, QL and MAT

5.3 PERFORMANCE ON NBT BY INTENDED FACULTY

Candidates are asked to indicate their first, second and third choice of faculty to which they have applied or will apply. Only the first choice of intended faculty was used in this analysis. All applicants to the majority of Health Science faculties are required to write the NBTs as part of the admission requirements. The use of NBT for admission, placement and teaching and learning in other programmes varies across institutions and faculties. Degree benchmarks are applied in this section as we do not know which programme of study candidates will embark upon. In section 8, Degree and Diploma/Higher certificate benchmarks will be reported separately when the NSC subsample is considered and reported depending on the NSC level of achievement.

5.3.1 AL PERFORMANCE BY INTENDED FACULTY

The AL performance of candidates across all the faculties are presented in Figure 8;

Proficient band

Overall the proportion of candidates with scores in the Proficient band for the faculties was 29% or below, apart from the prospective students of the Science/Mathematics faculties of which 38% of candidates had scores which were deemed proficient. Of the proportion of candidates applying to the faculties of Education, only 6% of the scores were in the AL Proficient band, while only 7% of prospective students who reported that they would be enrolling in the faculties of Allied Healthcare and Nursing and Hospitality/Tourism were in the Proficient band. The small proportion of candidates with scores in this band in the various faculties is an indication of the low number of candidates who would be expected to cope with academic study at university without additional AL support.

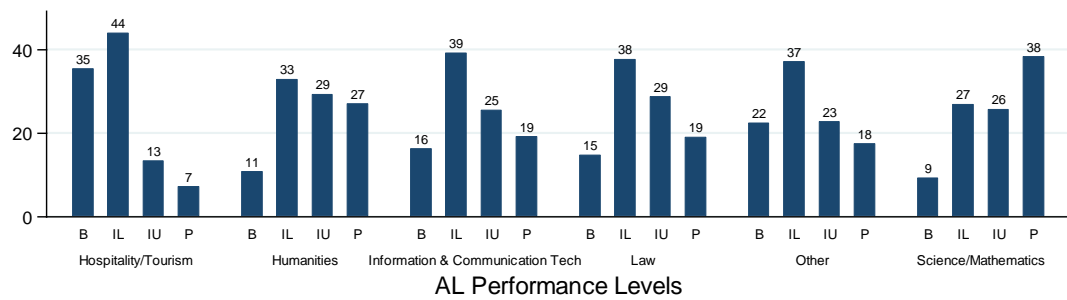
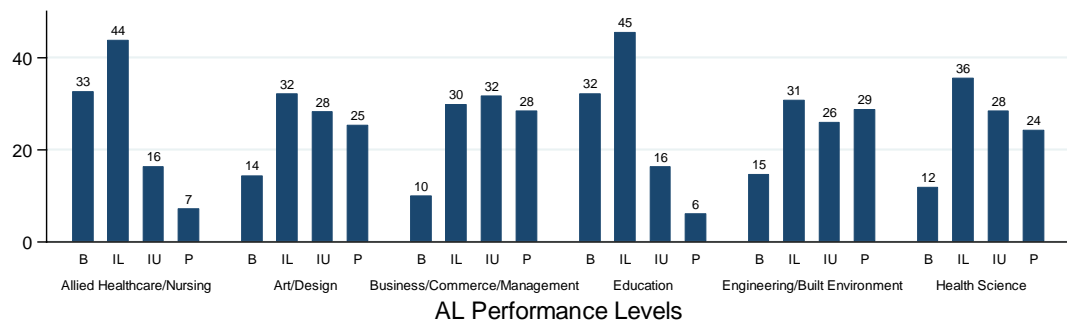
Intermediate band

A high proportion of candidates fell in the Intermediate band – both Lower and Upper Intermediate – ranging between 53% and 67% of the cohort for each faculty group. The high number of candidates with scores in the Intermediate Lower performance bands in Education (45%), Allied Healthcare/Nursing (44%), and Hospitality/Tourism (44%) is an indication of the high proportion of candidates who would require additional AL support while undertaking their academic studies at universities.

Basic band

The high proportion of candidates in the Allied Healthcare/Nursing (33%), Education (32%) and Hospitality/Tourism (35%) whose scores fall within the Basic performance band is a cause for concern as these candidates would require considerable AL support in order to cope with the academic demands of tertiary level study.

2020 NBT Cohort Academic Literacy Performance Levels By Intended Faculty of Study



B = Basic; IL = Intermediate Lower; IU = Intermediate Upper; P = Proficient (n = 72,118)

Figure 6 NBT Academic Literacy performance levels by intended faculty of study

5.3.2 *QL PERFORMANCE BY INTENDED FACULTY*

The QL performance of candidates across all the faculties are presented in Figure 9;

Proficient band

Overall the proportion of candidates with scores in the Proficient band for the faculties was below 23%, with only one faculty, that of Science/Mathematics, recording 23% of candidates whose score were deemed proficient. Of the proportion of candidates applying to the faculty of Engineering and Built Environment, 20% of the scores were in the QL Proficient band. The small proportion of candidates with scores in the Proficient band in the various faculties is an indication of the low number of candidates who would be expected to cope with academic study at university without additional QL support.

Intermediate band

Overall for each faculty the proportion of candidates with scores in the Intermediate Lower performance bands were between 13% and 33%, except for Health Sciences (14%), Allied Healthcare/Nursing (22%) and Education (20%). Also, the faculties of Business/Commerce/Management (48%), Law (50%) and Other (48%) had particularly high proportions of candidates in the Intermediate band (Lower and Upper Intermediate combined). These results are an indication of the relatively high proportion of candidates who would require additional QL support while undertaking their academic studies at universities. These courses are reliant on quantitative literacy and candidates will need support. Not all candidates may require QL support to the same extent, as this is dependent on the courses they undertake, and some courses have minimal or no QL content.

Basic band

A worrying trend is the high proportion of candidates whose scores fall within the Basic performance band in terms of QL performance across all the faculties. The proportion of candidates in Hospitality/Tourism (80%), Education (78%) and Allied Healthcare/Nursing (72%) faculties was very high with nearly three-quarters of the candidates with QL scores in the Basic band. The proportions of the scores of candidates in quantitative faculties such as Health Sciences (39%), Business/Commerce/Management (36%), Engineering/Built Environment (32%) and Science/Maths (25%) were also high, which means that these candidates would require considerable QL support in order to cope with the academic demands of tertiary level study. The faculties of Engineering and the Built Environment (32%) and Science/Mathematics (25%) had the smallest proportions of candidates with scores in the Basic performance band.

2020 NBT Cohort Quantitative Literacy Performance Levels By Intended Faculty of Study

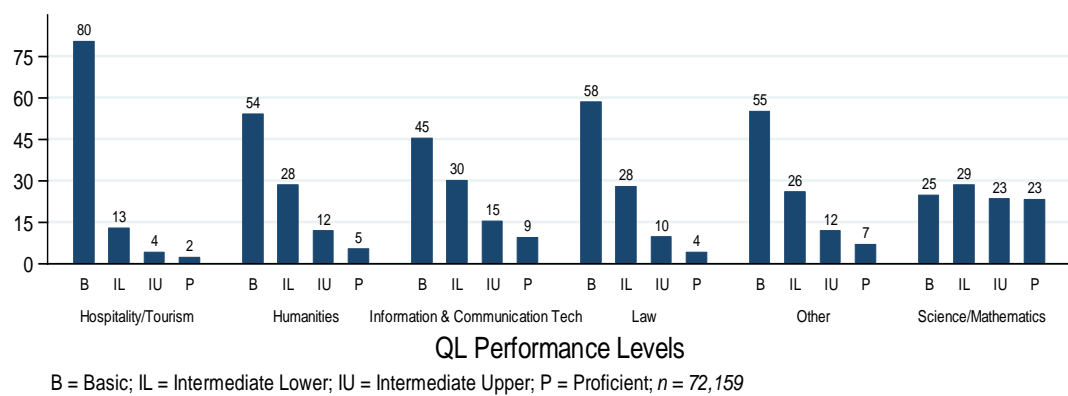
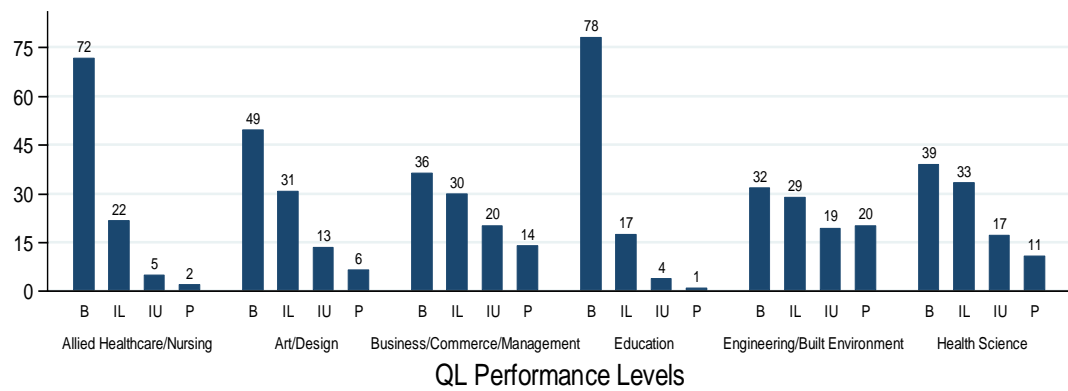


Figure 7 2020 NBT Quantitative Literacy performance levels by intended faculty of study

5.3.3 MAT PERFORMANCE BY INTENDED FACULTY

The level of performance levels in Mathematics is very low among all the candidates as indicated in Figure 10;

Proficient band

The highest numbers of Proficient scores in MAT reflect candidates intending to study Science/Mathematics (19%), and Engineering and the Built Environment (16%), followed by the Health Science (10%). In the Allied Healthcare/Nursing and Education faculties the number of Proficient scores in MAT is close to 1%. This is a matter of concern if any of these programmes include mathematics courses. The percentage of scores in the Proficient benchmark band for Education reflects a problem if a sizeable proportion of these candidates are intending to become mathematics teachers.

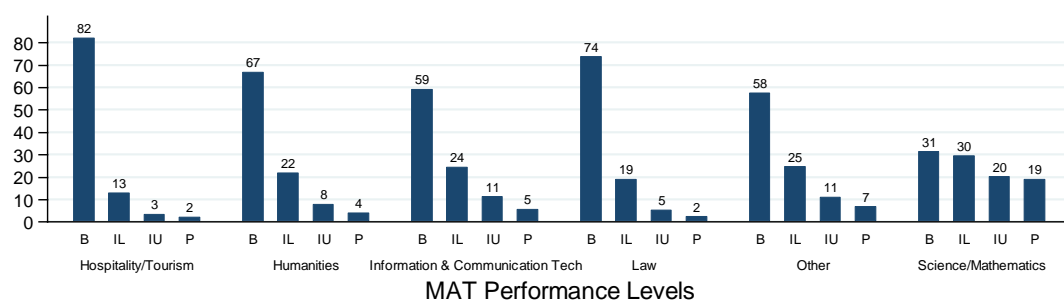
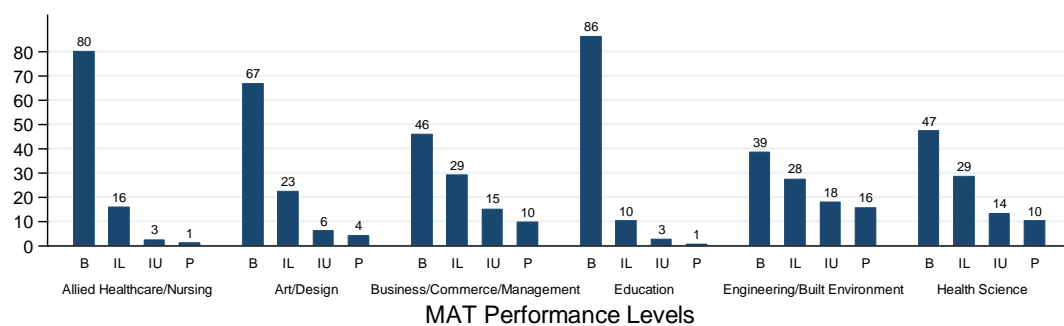
Intermediate band

A sizeable proportion of candidates' MAT scores are in the Intermediate band ranging 24% and 50% of the cohort for each faculty apart from Allied Healthcare/Nursing (19%), Hospitality/Tourism (16%) and Education (13%), with each have a very high proportion of candidates scoring in the Basic band. These candidates will all require additional curriculum-integrated support if they are to succeed in the mathematics courses they undertake. There are some faculties (such as Law, Hospitality/Tourism) in which programmes do not have a Mathematics component, but for those that do (such as Engineering and the Built Environment), faculties will need to carefully consider the extent and the type of support that they need to provide.

Basic band

The highest percentages of scores in the Basic band in MAT represent candidates intending to study Allied Healthcare and Nursing and Education. It is unlikely that these candidates will cope with the Mathematics component of their courses.

2020 NBT cohort MAT Performance Levels by Intended Faculty of Study



B = Basic; IL = Intermediate Lower; IU = Intermediate Upper; P = Proficient; $n = 55,231$

Figure 8 MAT performance levels by intended programme of study, NBT 2020 intake cycle

5.4 PERFORMANCE ON THE NBT BY TEST LANGUAGE

This section reports a comparison in performance by candidates who wrote the NBT in English and Afrikaans. A total of 5,486 (7.6%) candidates wrote the NBT AQL in Afrikaans while 5,486 (7.4%) candidates wrote the NBT MAT in Afrikaans. This information is summarised in Table 9 below.

Table 9 Test Language, NBT 2020 intake cycle

AQL/MAT test language	Wrote AL		Wrote QL		Wrote MAT	
	Count	%	Count	%	Count	%
Afrikaans	5,486	7.610	5,486	7.600	C	7.470
English	66,632	92.39	66,673	92.40	51,099	92.53
Total	72,118	100	72,159	100	55,231	100

Table 10 reports the descriptive statistics for the 2020 intake cycle Afrikaans and English NBT cohort. Inspection of the means suggests that the Afrikaans cohort obtained higher mean scores on all the tests compared to the English cohort. Analysis of the tests has shown that at item and test level, there is no language DIF (differential item functioning, commonly referred to as bias). Factors beyond the test may therefore explain any statistically significant performance differences between those who wrote the test in English and those who wrote it in Afrikaans, but further research and analysis is required (including testing the significance of the difference).

Table 10 Descriptive statistics for AL, QL, and MAT of the 2019 NBT cohort by test language

NBT Test	Test language	n	Mean	SD	Min.	1st Quartile	Median	3rd Quartile	Max.
AL	Afrikaans	5,486	62.46	11.85	29.00	54.00	64.00	71.00	94.00
	English	66,632	54.15	14.73	01.00	42.00	52.00	66.00	96.00
QL	Afrikaans	5,486	56.10	17.55	16.00	40.00	56.00	70.00	98.00
	English	66,673	44.99	15.36	01.00	34.00	40.00	53.00	99.00
MAT	Afrikaans	4,132	51.10	19.63	12.00	34.00	48.00	67.00	98.00
	English	51,099	40.06	16.66	02.00	28.00	33.00	48.00	98.00

5.4.1 AL PERFORMANCE ON TESTS WRITTEN IN AFRIKAANS AND ENGLISH

A higher proportion of candidates (39.17%) who wrote the NBT AL in Afrikaans had scores in the Proficient band compared to those writing the test in English (22.06%), while a higher proportion of those writing in English (16.29%) had scores in the Basic band compared to those writing in Afrikaans (3.52%). In terms of the Intermediate bands (Intermediate Upper and Lower), 57.31% of Afrikaans candidates' scores and 61.65% of English candidates' scores fall into these bands. Although there is not such a marked difference between these two groups in terms of the combined Intermediate Upper and Lower scores, it is important to note the difference in the distribution of candidates between these two categories. The proportion of candidates' scores grouped under Intermediate Lower and Intermediate Upper was 19.87% and 37.44% for the cohort that wrote in Afrikaans (n = 5,486 candidates) respectively, whilst 36.04% the cohort that wrote in English (n = 66,632) fell in the Intermediate Lower and 25.61% in the Intermediate Upper bands.

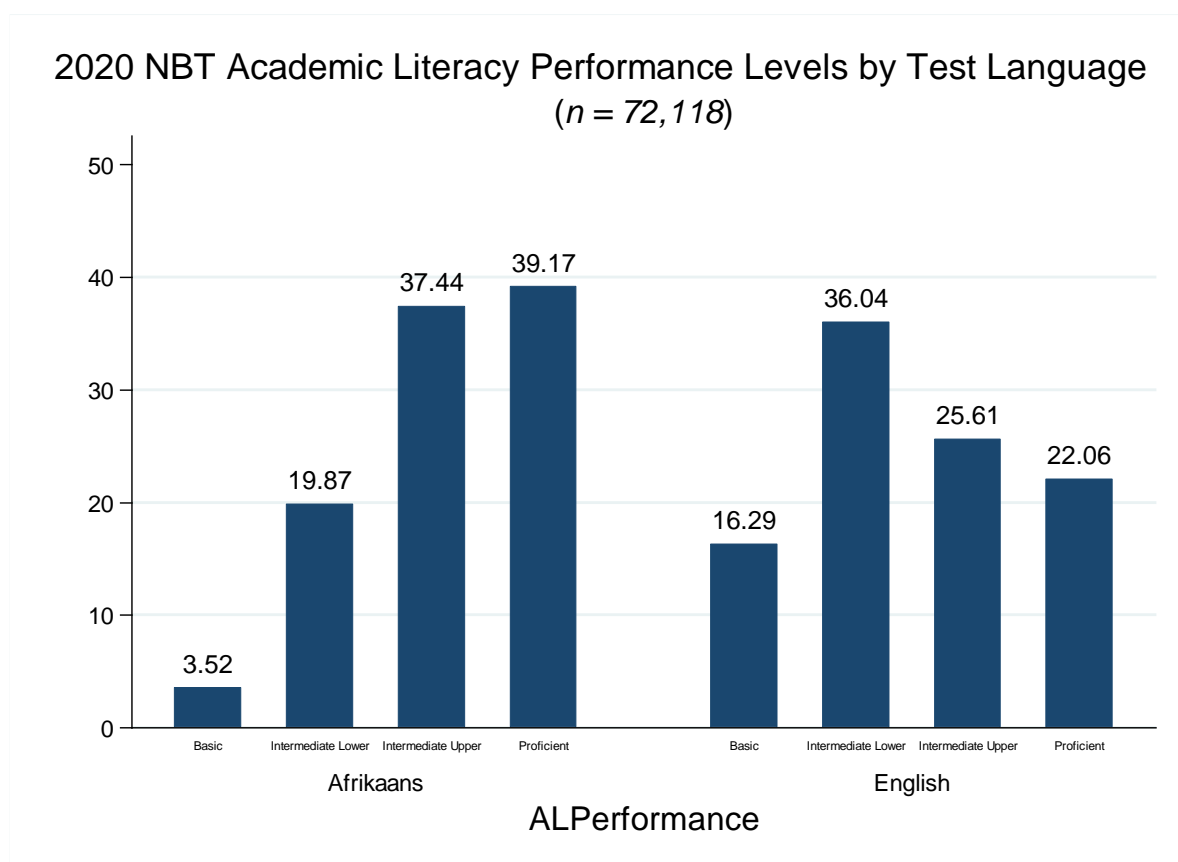


Figure 9 2020 NBT AL Performance Levels by test language

5.4.2 QL PERFORMANCE ON TESTS WRITTEN IN AFRIKAANS AND ENGLISH

The Afrikaans writers represented 9.07% of the total number of candidates who wrote the QL tests for the 2020 intake cycle. Of these, 26% of the scores fell in the Proficient band and 24% of the scores were in the Basic band. The English writers on the other hand showed a slightly different performance picture. The English writers represented 92.39% of the total candidates and 47% of their scores fell within the Basic performance band, while 9% of the scores fell within the Proficient performance band. Despite the Afrikaans writers being a smaller proportion of all candidates their overall performance was better than that of the English writers across the four performance categories, as shown in Figure 12 below.

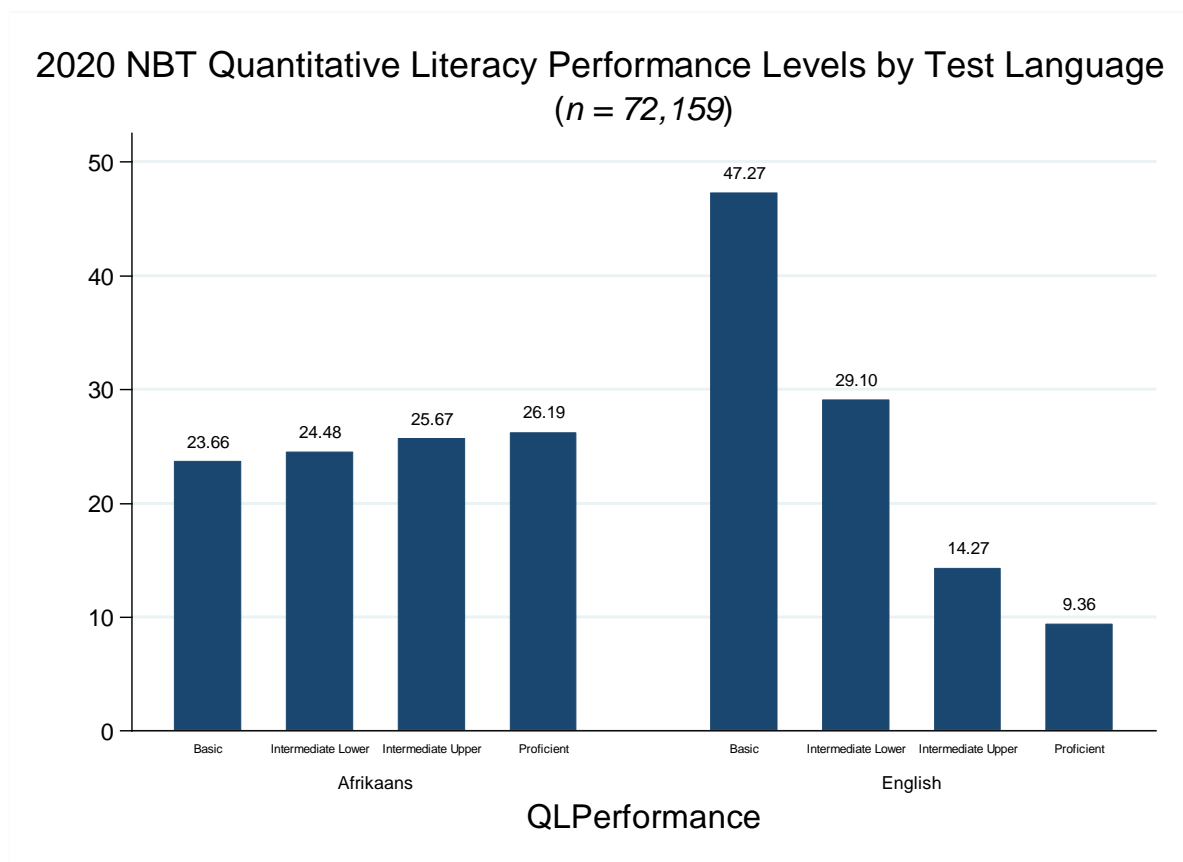


Figure 10 2020 NBT QL Performance Levels by test language

5.4.3 MAT PERFORMANCE ON TESTS WRITTEN IN AFRIKAANS AND ENGLISH

Roughly 23% of those who wrote the Afrikaans MAT test had scores in the Proficient category compared to just under 9% of the English group. 26% of those who wrote the Afrikaans MAT test had scores in the Basic category compared to 53% of the candidates in the English group.

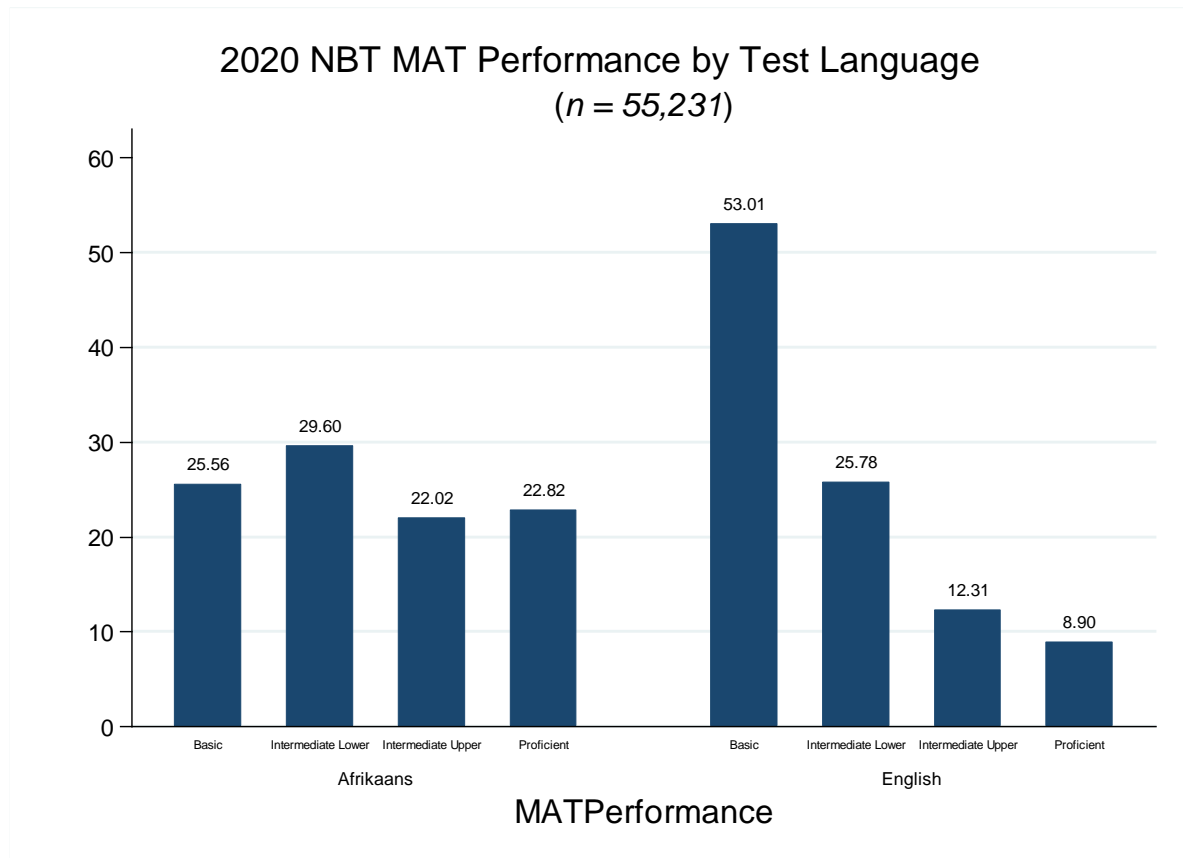


Figure 11 2020 NBT MAT Performance Levels by test language

5.5 PERFORMANCE PROFILE OF SOUTH AFRICAN AND NON-SOUTH AFRICAN CANDIDATES

This section reports the comparisons between South African citizens and non-South African candidates. The 2020 intake NBT cohort consisted of 3,746 (5.19%) candidates who reported themselves as non-South African citizens. This included candidates who reported themselves as having SADC citizenship, citizenship from other African countries, and elsewhere.

Table 11 Number of test writers: SA citizens vs non-SA candidates

	Wrote AL		Wrote QL		Wrote MAT	
	n	%	n	%	n	%
South African	68,372	94.81	68,401	94.79	52,315	94.72
Non-South African	3,746	5.190	3,758	5.210	2,916	5.280
Total	72,118	100	72,159	100	55,231	100

Table 12 Scores: SA citizens vs non-SA candidates

	n	Mean	sd	min	p25	p50	p75	max
AL SCORE								
South African	68,372	54.46	14.72	01.00	42.00	53.00	66.00	96.00
non-South African	3,746	60.61	12.86	21.00	51.00	61.00	70.00	91.00
Total	72,118	54.78	14.69	01.00	42.00	53.00	67.00	96.00
QL SCORE								
South African	68,401	45.50	15.71	01.00	34.00	41.00	54.00	99.00
non-South African	3,758	52.02	16.45	15.00	39.00	50.00	64.00	98.00
Total	72,159	45.84	15.81	01.00	34.00	41.00	55.00	99.00
MAT SCORE								
South African	52,315	40.69	17.10	02.00	28.00	34.00	49.00	98.00
non-South African	2,916	44.35	17.77	19.00	29.00	40.00	55.00	98.00
Total	55,231	40.88	17.15	02.00	28.00	34.00	50.00	98.00

5.5.1 AL PERFORMANCE BY CITIZENSHIP

A higher proportion of the non-South African candidates (32.94%) had scores that fall in the Proficient band compared to the South African candidates (22.84%), while a higher proportion of the South African candidates (15.86%) had scores in the Basic band compared to the non-South African candidates (5.34%). In terms of the Intermediate bands (Upper and Lower Intermediate), 61.72% of non-South African candidates' scores and 61.3% of the South African candidates' scores fall into these bands. The proportion of candidates' scores grouped under Intermediate Lower and Intermediate Upper was 23.92% and 37.92% of the non-South African cohort (n = 3746 candidates) respectively, whilst 35.41% the cohort who wrote in English (n = 68372) fall in the Intermediate Lower and 25.89% in the Intermediate Upper.

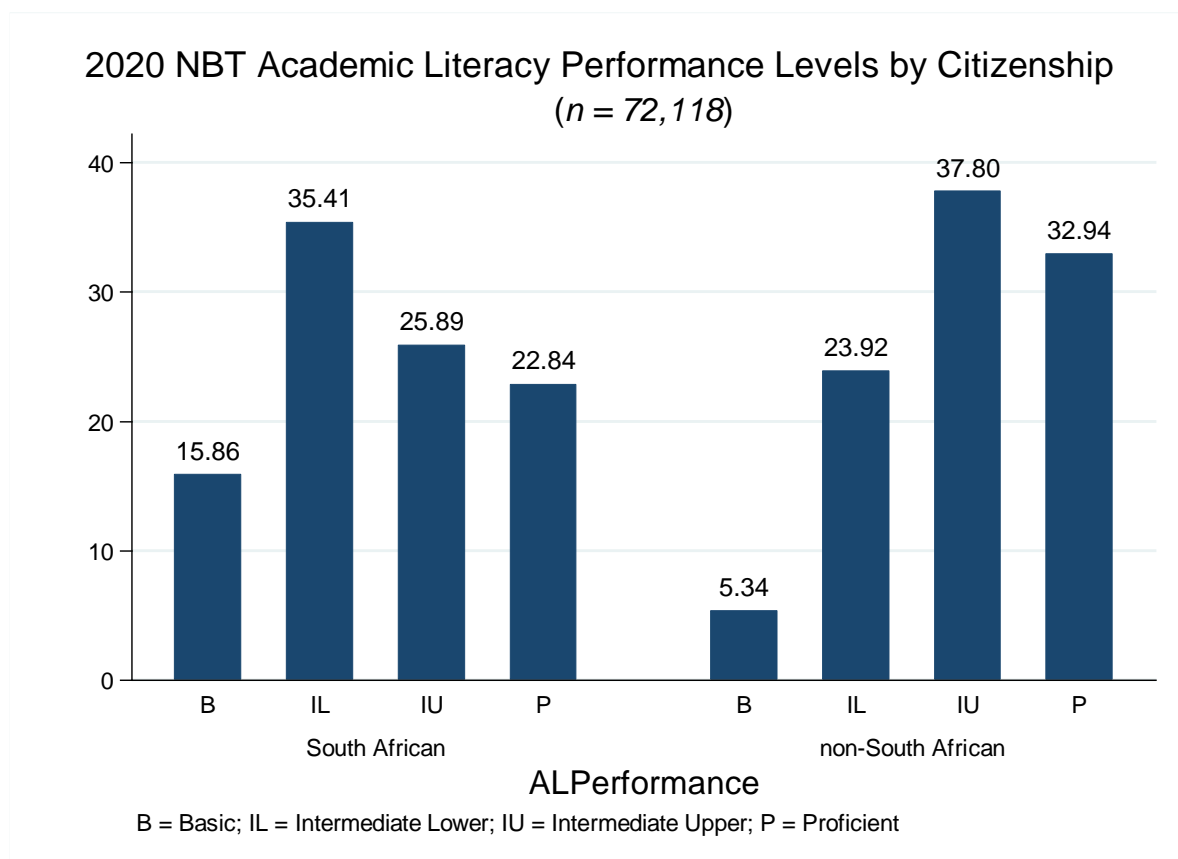


Figure 12 2020 NBT AL performance levels by citizenship

5.5.2 QL PERFORMANCE BY CITIZENSHIP

Non-South African candidates also write the NBT and this group represented 5.21 % of the total number of candidates who wrote the QL tests. This small proportion of candidates performed better than their South African counterparts. The results show that 17% of non-South Africans had scores that were in the Proficient band for QL compared to 10% of the South African group. The proportion of candidates with scores in the Basic category for the South African group was 47% compared to the non-South African group of 27%. In the Intermediate performance category, the non-South African candidates fared better than their South African counterparts. The non-South African candidates in the Intermediate Upper group represented 23% of the total number of candidates compared with 15% for the South African candidates. It would appear that fewer non-South African candidates would require QL support than their South African counterparts.

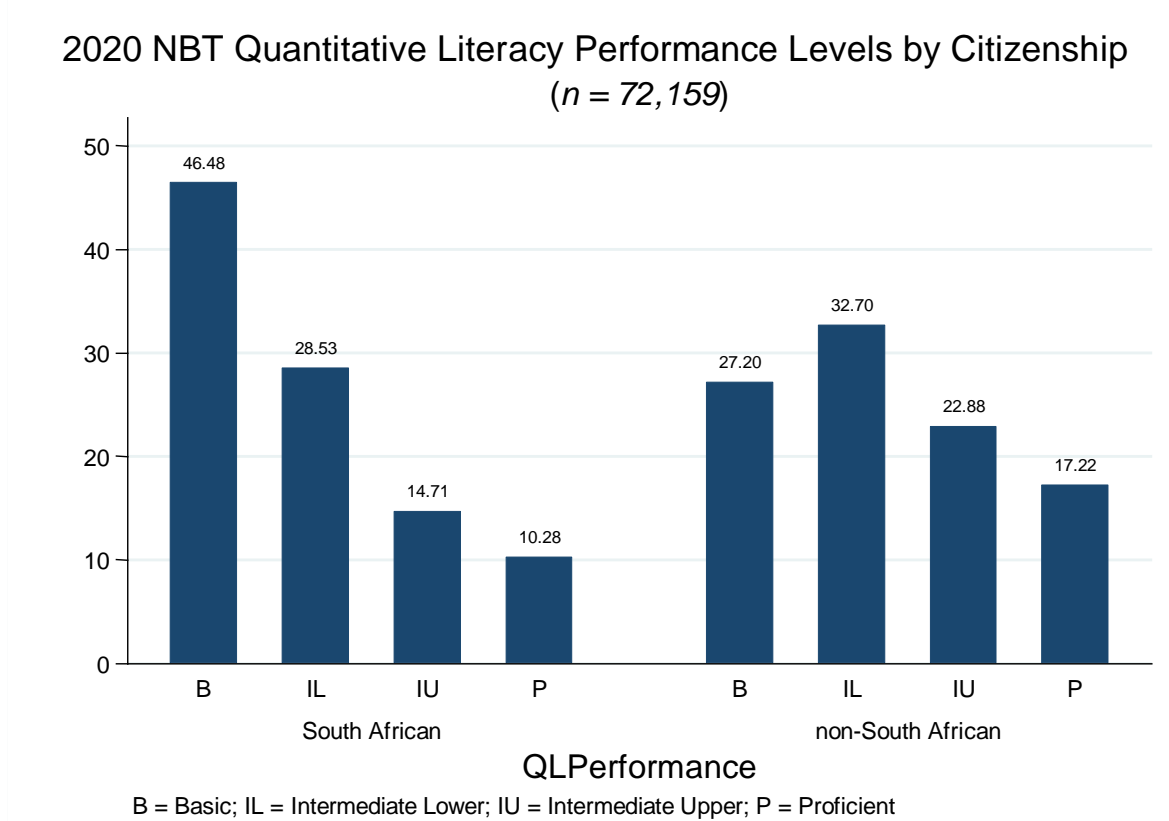


Figure 13 2020 NBT QL performance levels by citizenship

5.5.3 MAT PERFORMANCE BY CITIZENSHIP

MAT performance among the non-South African candidates was a little better than that of the South African candidates. Of the non-South African candidates, 12% had scores in the Proficient band in MAT compared to 10% of the South African candidates; 39% of the non-South African candidates had scores in the Basic category for MAT compared to 52% of the South African candidates whose scores were in the Basic category in MAT. The difference in the Basic category is somewhat offset by the difference in the Intermediate Lower category (31% of the non-South African group; 26% of the South African candidates).

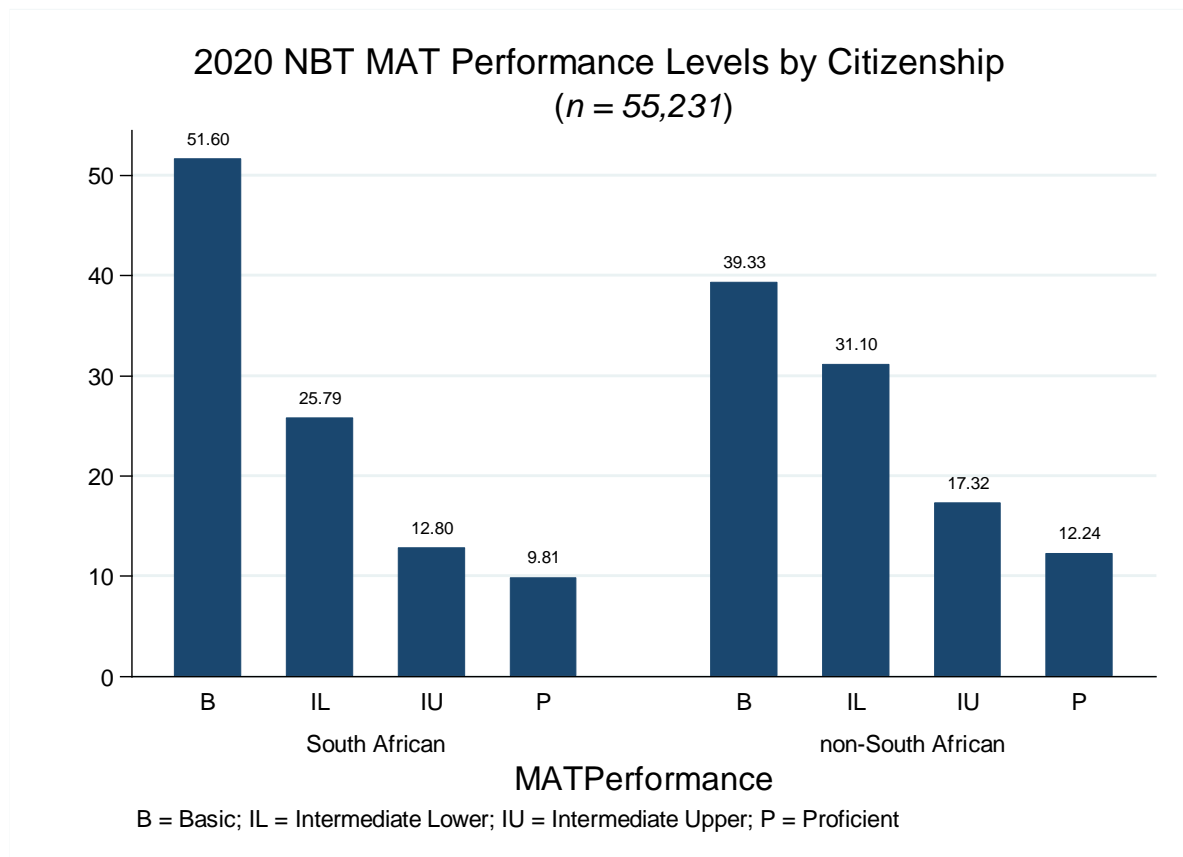


Figure 14 2020 NBT MAT performance levels by citizenship

The non-South African candidates appeared to have performed slightly better in AL, QL and MAT than the South African candidates.

5.6 PERFORMANCE ON NBT AT SUBDOMAIN LEVEL

The main uses of NBT data by institutions are for the selection and appropriate placement of students. Once these students are accepted at institutions, the NBT can be used for providing information about the academic needs of these students. In order to use NBT diagnostic information for this purpose, institutions need to provide the NBTP with the actual list of their registered students.

This analysis can also be done for a particular course or programme, giving lecturers a useful tool for aligning their teaching with the students they actually have. The subdomain analysis for the various faculties gives an indication of the competence areas in which NBT candidates have particular strengths and areas in which they are likely to experience difficulties. The subdomain analyses also highlight the competence areas where prospective students may experience challenges when faced with the demands of higher education that are aligned with the NBT domains.

An understanding of the difficulties that students/learners experience is useful for teaching and learning as it can aid educators at schools as well as lecturers at university in changing, adapting or improving their teaching strategies.

This section presents the results on the various subdomains of AL, QL and MAT for the 2020 intake NBT cohort. This analysis has great potential to contribute to making institutional teaching and learning initiatives more responsive to the actual needs of students.

The analysis by sub-domain is based on the intended faculty of study indicated by the candidates when they write the NBT. Candidates are asked to indicate their first, second and third choice of faculty to which they have applied or will apply. Only the first choice of intended faculty was used in this analysis. Data is not collected by the NBT project on actual placement of all the candidates within faculties or institutions. Caution should therefore be used when decisions are made based on the results from intended faculty of study.

5.6.1 *THE CONSTRUCT OF THE AL TEST*

The NBT AL test is an assessment of the generic academic reading ability of applicants entering courses of higher education study. The construct of academic literacy on which the test is based has a well-theorised history (see, for example, Bachman and Palmer, 1996; Cummins, 2000; Yeld, 2001; Cliff, Yeld and Hanslo, 2003; Cliff and Yeld, 2006) and empirical studies have been reported exploring associations between performance on this construct and academic performance in a wide range of South African higher education contexts (cf. Cliff, Ramaboa and Pearce, 2007; Cliff and Hanslo, 2009). The construct of the test is summarised in the table below:

Table 13 NBT AL Subdomains

Subdomain Assessed	Description
Perceiving and understanding cohesion in text	Readers' abilities to be able to 'see' anaphoric and cataphoric links in text, as well as other mechanisms that connect parts of text to their antecedents or to what follows
Understanding the communicative function of sentences	Readers' abilities to 'see' how parts of sentences / discourse define other parts; or are examples of ideas; or are supports for arguments; or attempts to persuade
Understanding discourse relations between parts of text	Readers' capacities to 'see' the structure and organisation of discourse and argument, by paying attention – within and between paragraphs in text – to transitions in argument; superordinate and subordinate ideas; introductions and conclusions; logical development
Separating the essential from the non-essential	Readers' capacities to 'see' main ideas and supporting detail; statements and examples; facts and opinions; propositions and their arguments; being able to classify, categorise and 'label'
Grammar / syntax as these affect academic meaning and interpretation	Readers' abilities to understand and analyse the extent to which grammatical and sentence structures are organised in academic language, and the extent to which these structures affect and can change meaning
Extrapolation, application and inferencing	Readers' capacities to draw conclusions and apply insights, either on the basis of what is stated in texts or is implied by these texts.
Metaphorical expression	Readers' abilities to understand and work with metaphor in language. This includes their capacity to perceive language connotation, word play, ambiguity, idiomatic expressions, and so on
Understanding text <i>genre</i>	Readers' abilities to perceive 'audience' in text and purpose in writing, including an ability to understand text register (formality / informality) and tone (didactic / informative / persuasive / etc.)
Vocabulary	Readers' abilities to derive/work out word meanings from their context

The boxplots that follow provide performance information for the NBT AL candidates in the 2020 intake year. The candidates were asked to indicate their first choice of field of study and the associated faculty at the institution at which they wished to study. The boxplots are for eleven faculties (with a twelfth graphic for applicants who indicated "Other" as their faculty choice) and show the distributions of student scores on the different subdomains of the NBT AL.

For the purpose of this report, performance on the NBT AL subdomains by candidates who had indicated their intention to enrol for courses in various faculties was examined. These faculties included the following: Allied Health Care/Nursing, Art/Design, Business/Commerce/Management, Education, Engineering/Built Environment, Health Science, Hospitality/Tourism, Humanities, Information and Communication Technology, Law, and Science/Mathematics. The general picture of performance by candidates planning to study in all these faculties is that Discourse relations, Metaphorical expression, Text Genre, and Vocabulary seemed the most challenging for them and that performance on the remaining subdomains was relatively better, although Inferencing also appears to a difficult subdomain for certain groups. However, it is also clear that students in all these faculties would benefit from academic literacy support in all the subdomains that are assessed in the NBT AL.

As can be seen in Figure 32, for candidates who intended to enrol in the Allied Healthcare/Nursing faculty, for all but three of the subdomains 75% of all candidates scored 60% or below. For the three exceptions – Cohesion, Essential/Non-Essential, and Grammar/Syntax more than 50% of the candidates

scored 60% or below. For Discourse relations, Text Genre and Vocabulary 75% of the candidates scores below 50%. The subdomains with the lowest median scores were Discourse relations (33%), Inferencing (36%) and Text genre (33%). These results indicate that the majority of these students – even those who scored within the Proficient band – would need support in all the areas of academic literacy, particularly those with the greatest relevance to the courses they would be likely to study.

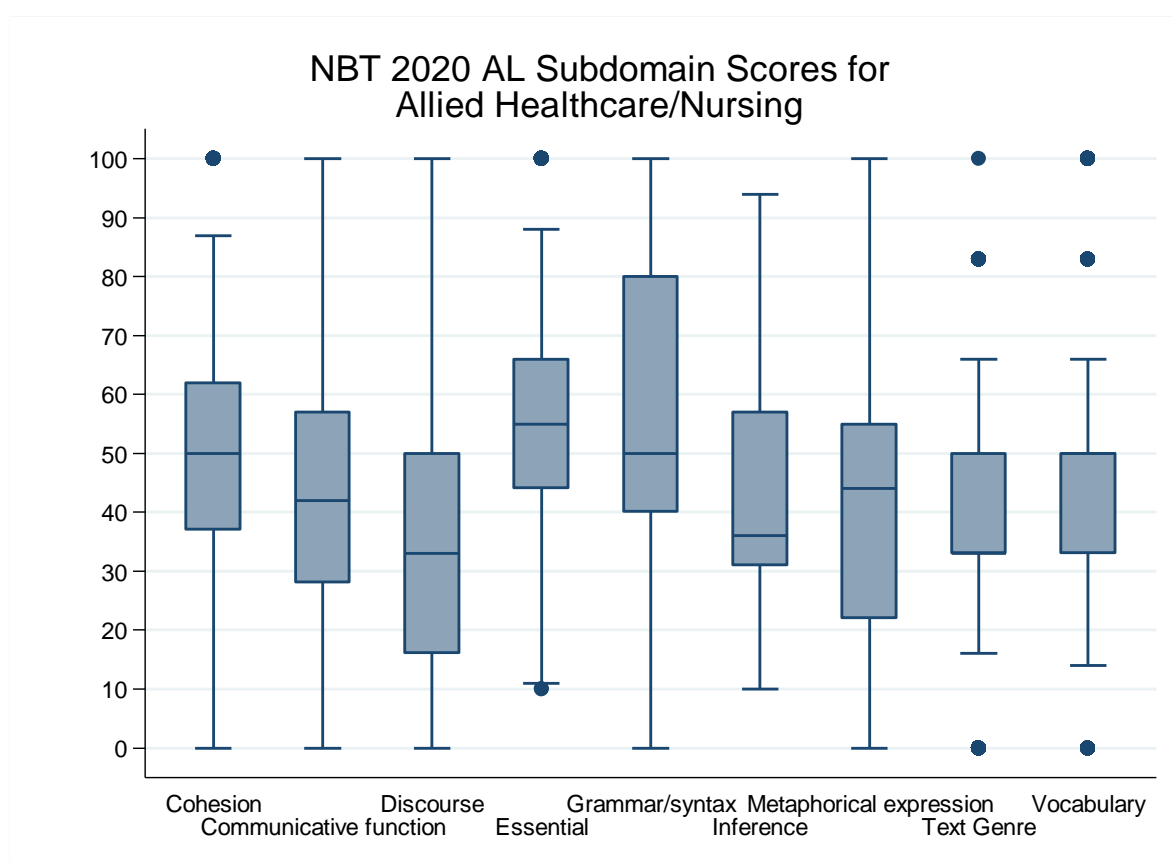


Figure 15 Allied Healthcare and Nursing AL subdomain performance, NBT 2020

A graphic representation of the AL performance of the candidates who planned to enrol in courses in the Art and Design faculty is captured in the boxplots in Figure 34. It is clear from these boxplots that the median scores of these candidates are in the Intermediate band in all subdomains. With the exception of the Cohesion and Essential/Non-Essential subdomains, 75% of all candidates scored at or below the 70 %. The subdomains with the lowest median scores were Discourse relations (50%), Text genre (50%) and Vocabulary (50%). The most problematic subdomain seems to be Text Genre as 75% of the candidates scored below 50%. The boxplots suggest that most students in this faculty would need some support in all the areas of academic literacy, particularly those with the greatest relevance to the courses they would be likely to study.

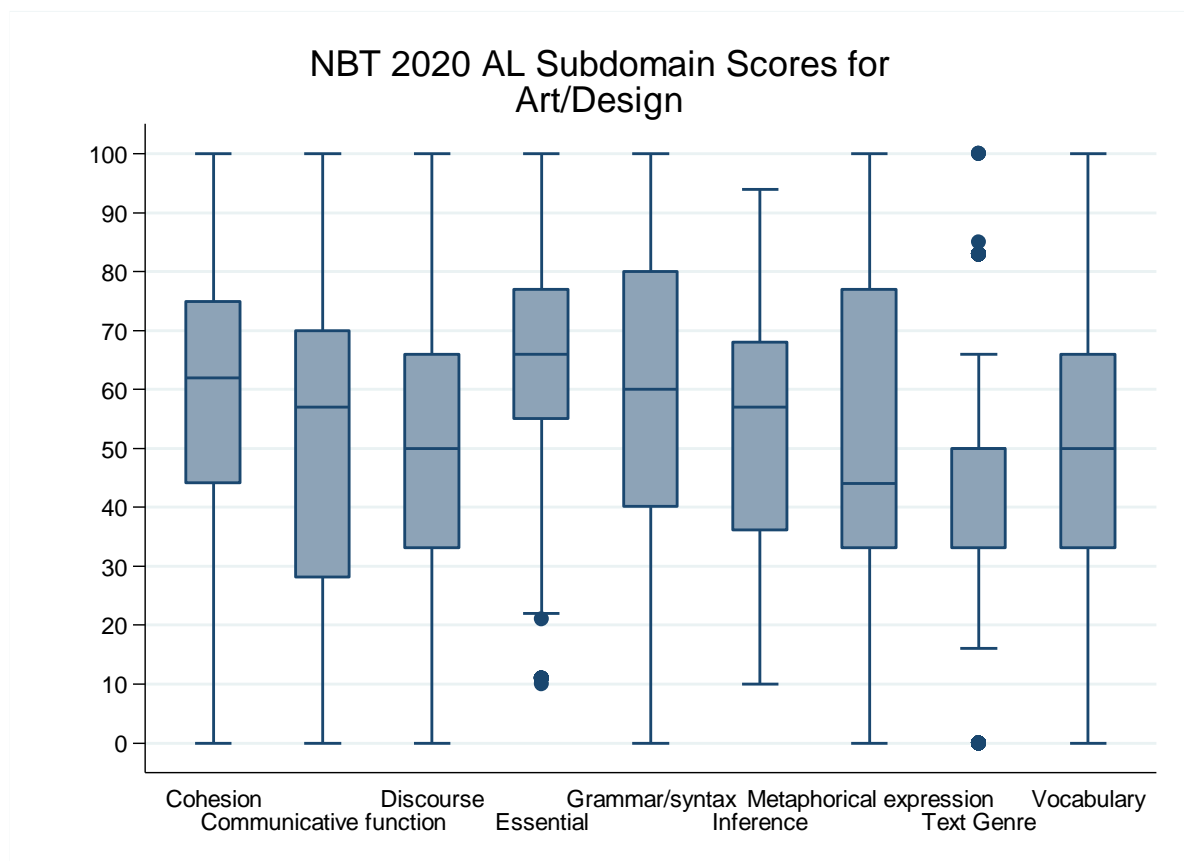


Figure 16 Art and Design AL subdomain performance, NBT 2020

In the boxplots in Figure 34, the NBT AL subdomain performance of candidates who were planning to apply for admission to the Business/ Commerce/ Management faculty is graphically presented. The median scores for this group are all within the Intermediate band, with the lowest medians for Discourse relations, Text Genre and Vocabulary (50%). In all subdomains apart from these three, 25% or more of the candidates had scores in the Proficient band (above 68%). These results suggest that many of the candidates would need curriculum support where the Discourse Relations, Text Genre and Vocabulary subdomains – and perhaps in the Communicative function, Inference and Metaphorical expression subdomains with their relatively low medians – are relevant in order to reach the required levels of proficiency in AL.

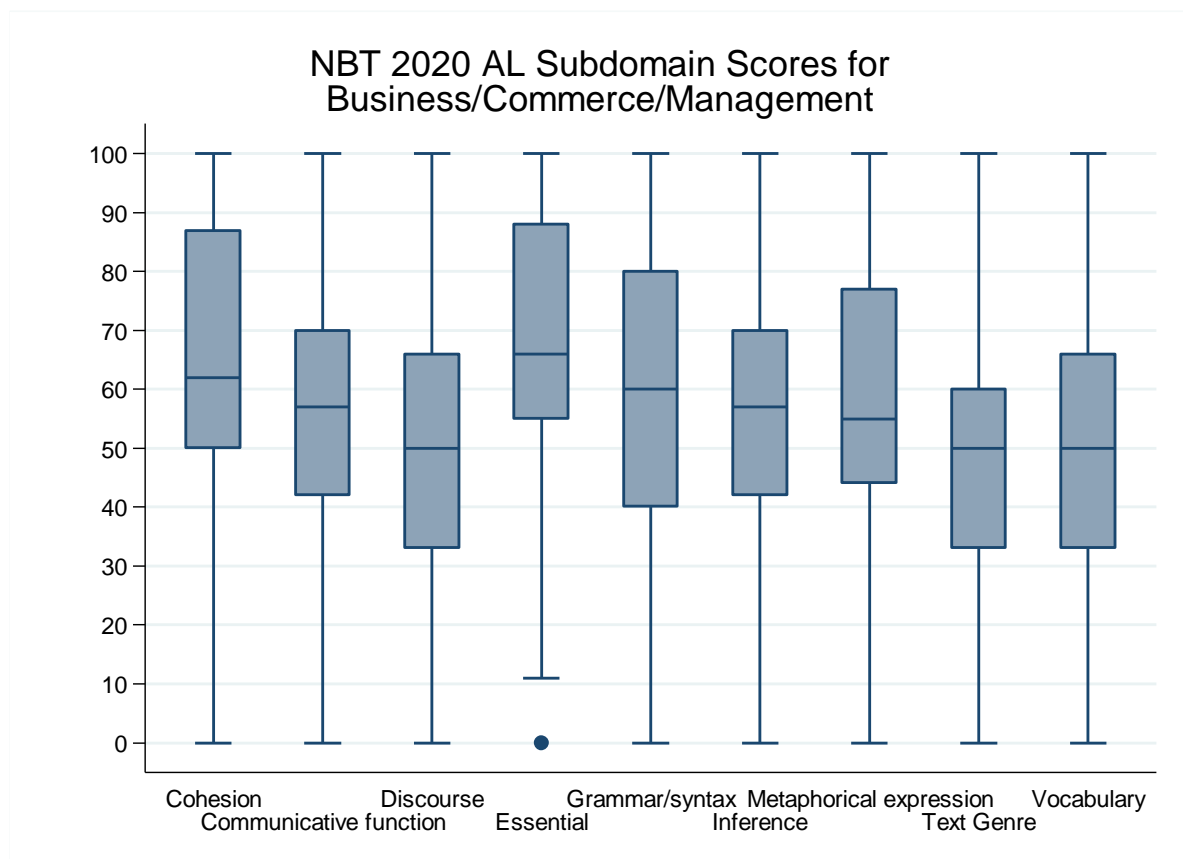


Figure 17 Business/Commerce and Management AL subdomain performance, NBT 2020

The performance of those who indicated that they intended to apply for admission to the faculty of Education on the subdomains of the NBT AL is presented in the boxplots in Figure 35. It can be seen from these boxplots that most of the median scores were all relatively low – all apart from the median score for Essential/Non-Essential were 50% or below – and 75% of the candidates scored below 50% in Discourse relations, Metaphorical expression, Text genre and Vocabulary. The subdomains with the lowest median scores were Discourse relations (33%), Inferencing (36%) and Text genre (33%). In general, the median scores in all subdomains was below what would be required at tertiary level. AL instructional support would help boost their academic literacy levels and would, in turn, improve their chances of success at academic study, and better equip them to become effective educators.

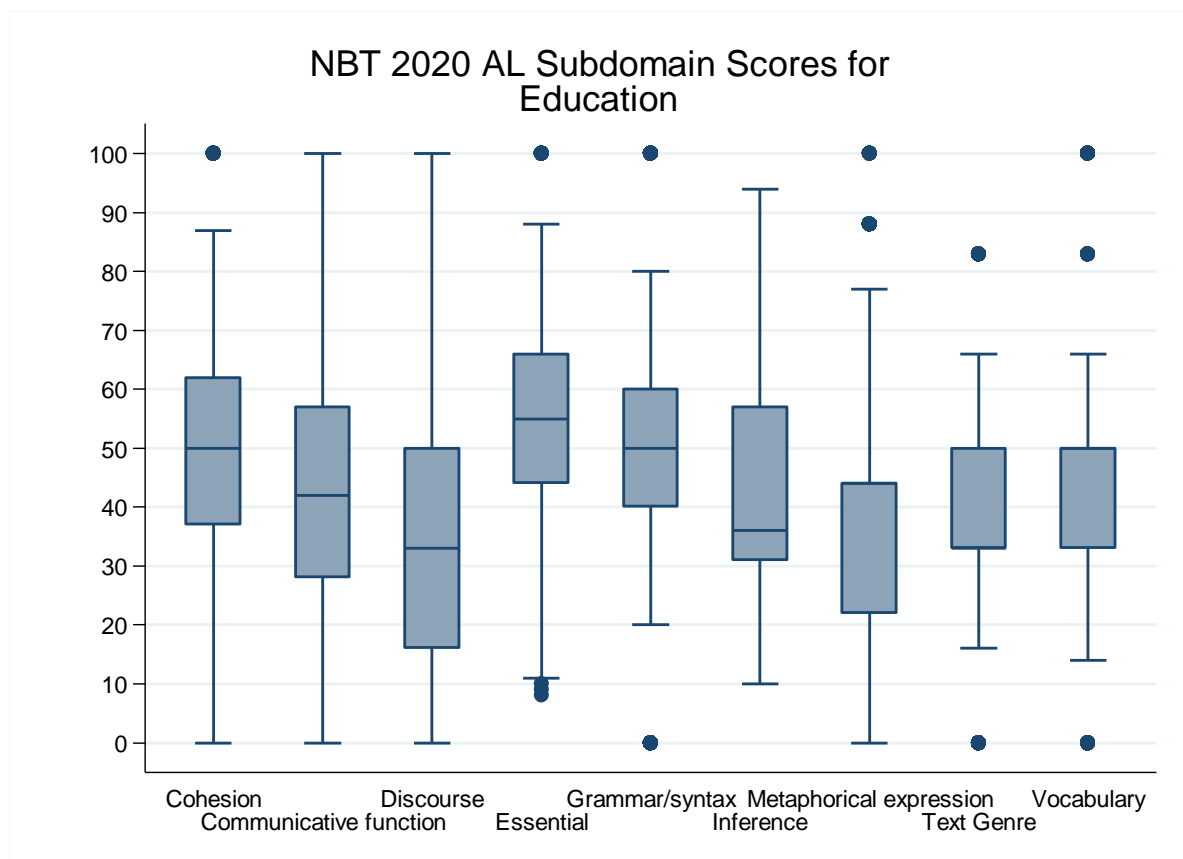


Figure 18 Education AL subdomain performance, NBT 2020

Figure 36 contains a boxplot representation of the NBT AL subdomain performance of candidates who intended to apply for studies in the Faculty of Engineering and Built Environment. The boxplots show once again that in all subdomains the median scores are in the Intermediate band. It is also clear that in terms of Discourse relations, Metaphorical expression, Text genre and Vocabulary, roughly 75% of the candidates scored below the Proficient band. In terms of Text genre, with the exception of a few outliers, the entire cohort scored below the Proficient band. Across all of the subdomains, over 50% of candidates scored within the Intermediate band and lower. The subdomain with the lowest median score was Metaphorical expression (44%). This suggests that most of these candidates would need extra support in the domain of academic literacy as a whole – but in Discourse relations, Metaphorical expression, Text genre and Vocabulary specifically – if they are to cope sufficiently well with the AL demands of academic study. Arguably, the AL subdomain in which the median score for these candidates is lowest (Text Genre) may not have the greatest relevance for Engineering students; however, shortfalls in any of the subdomains could impede comprehension, and any AL curriculum intervention for those who enrol in these areas should give attention to all these subdomains.

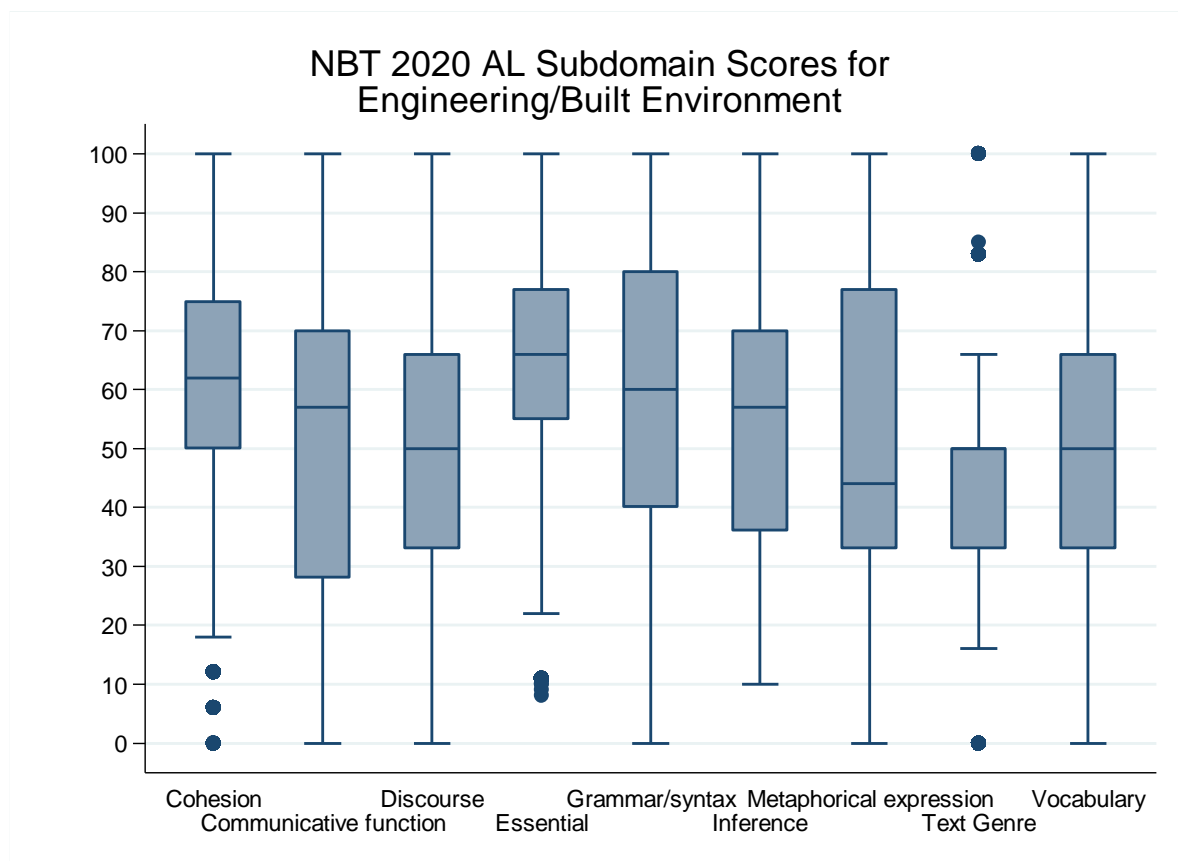


Figure 19 Engineering and Built Environment AL subdomain performance, NBT 2020

The NBT AL subdomain performance by candidates who intended to apply for courses in the Health Sciences is graphically presented in the boxplots in Figure 37. The overall picture is that the medians in all subdomains fell within the Intermediate band. The subdomains with the lowest median scores were Discourse relations (50%), Metaphorical expression (44%), Text Genre (50%), and Vocabulary (50%). According to the graph, performance in these subdomains seem to be the most problematic and Text Genre, once again, appears to be a particular weakness with the full cohort (excluding some outliers) scoring below the Proficient band. This again suggests that many of these candidates would struggle with some of the demands of academic literacy that are typical of higher education and that most of them would need relevant intervention to increase their chances of success at academic study.

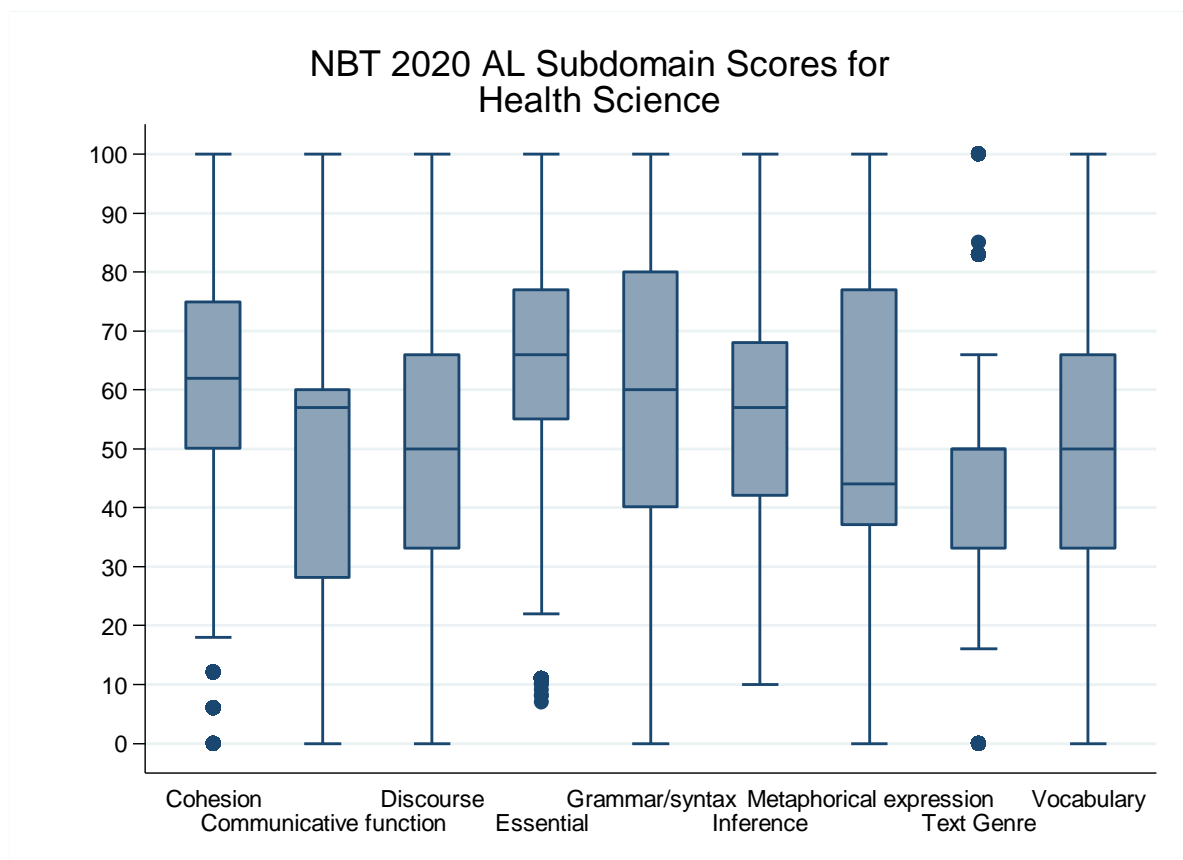


Figure 20 Health Science AL subdomain performance, NBT 2020

Figure 38 is a graphic representation of performance by candidates who intended to pursue studies in the Faculty of Hospitality and Tourism Management. At least 75% of these candidates scored below the Proficient band. Also, with the exception of a few outliers, the full cohort scored below the Proficient band in the Text genre and Vocabulary subdomains. The subdomains with the lowest median scores were Discourse relations (33%), Inferencing (36%) and Text genre (33%). These results suggest that an academic literacy intervention that focuses on all AL subdomains would help these candidates cope with the academic literacy demands of their courses.

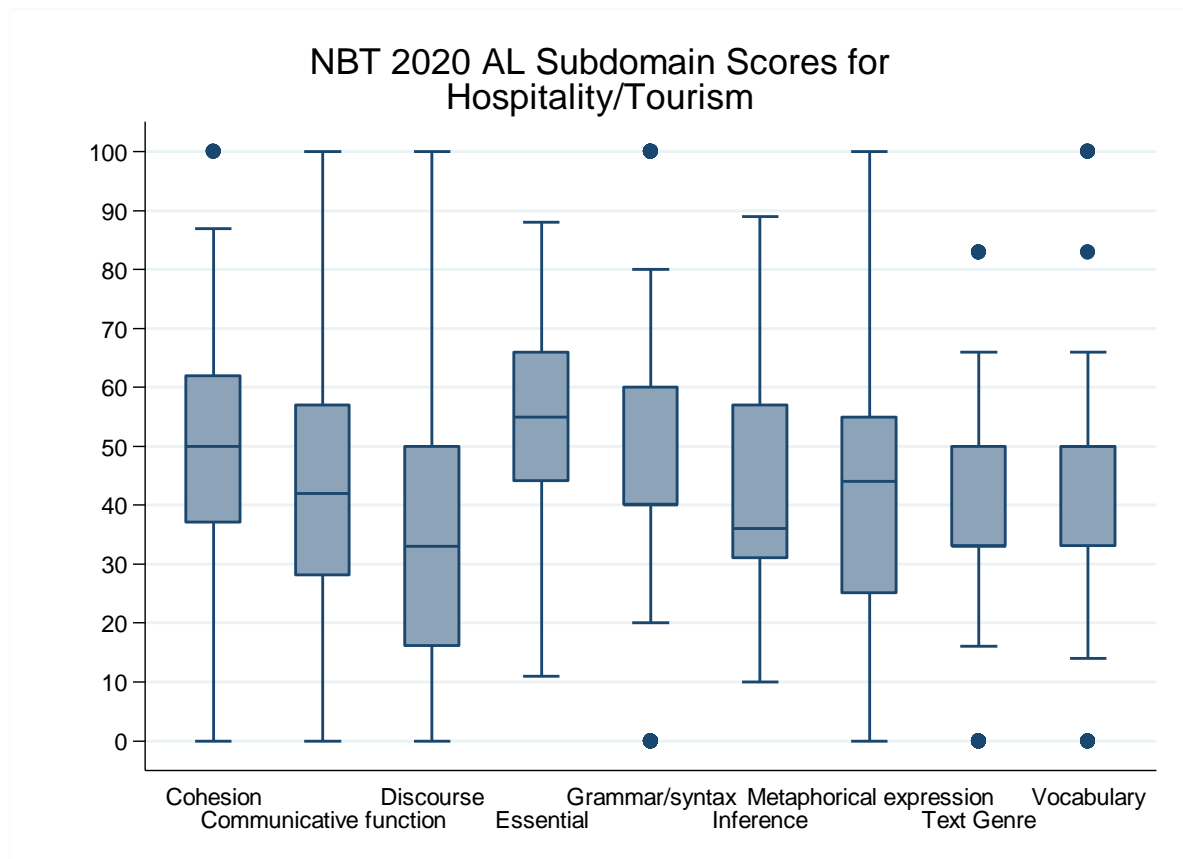


Figure 21 Hospitality/Tourism AL subdomain performance, NBT 2020

The NBT AL performance by candidates who intended to apply for admission to the Humanities faculty is captured in Figure 39. Across all the subdomains, the median scores were below the Proficient band and in terms of the Discourse relations, Inference, Text Genre and Vocabulary subdomains, 75 % of the candidates scored below the Proficient band. The subdomains with the lowest median scores were Discourse relations (50%), Metaphorical expression (44%), Text Genre (50%), and Vocabulary (50%). The ability to process texts is key to success in most courses offered in the Humanities. It is a cause for concern, therefore, that the majority of candidates who intended to pursue their studies in this faculty did not obtain scores in the AL Proficient band. These candidates would therefore need extra support in academic literacy to succeed at university.

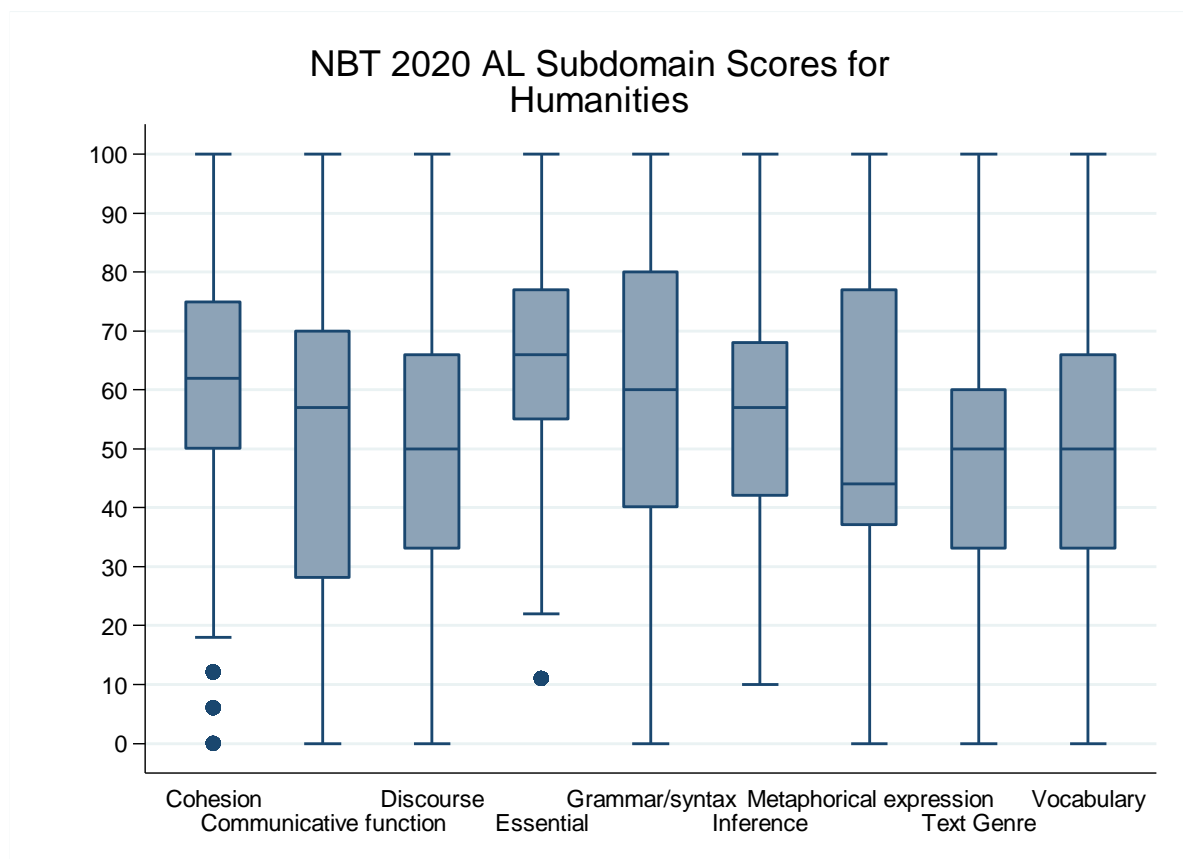


Figure 22 Humanities AL subdomain performance, NBT 2020

Performance in the subdomains of the NBT AL by candidates who planned to enrol for courses in Information and Communication Technology is captured in Figure 40. As can be seen from this graph, the median scores of these candidates were in the Intermediate band in all subdomains, an indication that the majority would struggle with the academic literacy challenges of university education. Again, the subdomains with the lowest median scores were Discourse relations (50%), Metaphorical expression (44%), Text Genre (50%), and Vocabulary (50%). Text Genre appears to be a particular weakness as, with the exception of a few outliers, the full cohort scored below the Proficient band. The overall picture, therefore, is that these candidates would benefit from instructional support on all subdomains (but specifically Text genre), including those in which performance was not quite as weak.

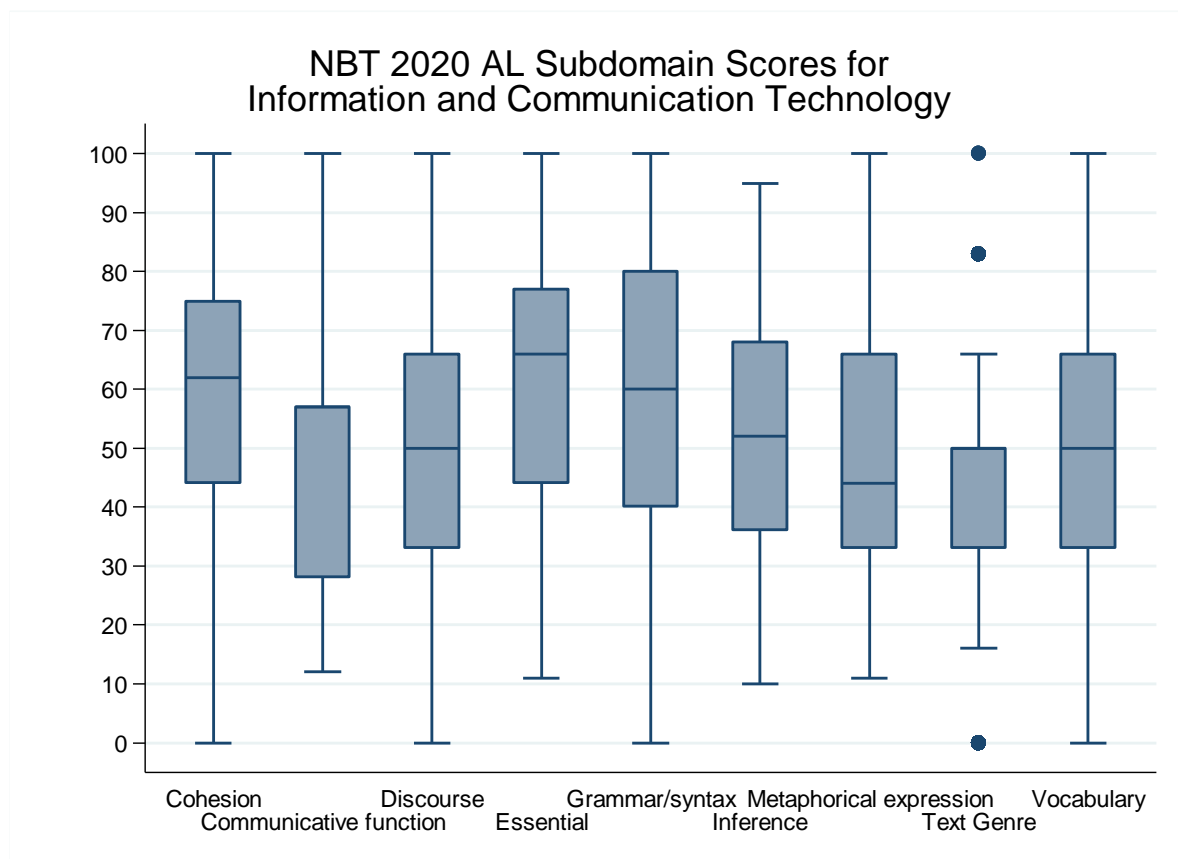


Figure 23 Information and Communication Technology AL subdomain performance, NBT 2020

The NBT AL performance by candidates who intended to study Law is captured in the boxplots in Figure 41. As can be seen from this graph, the median scores of these candidates were in the Intermediate band in all subdomains, an indication that the majority would struggle with the academic literacy challenges of university education. The subdomains with the lowest median scores were Discourse relations (50%), Metaphorical expression (44%), Text Genre (50%), and Vocabulary (50%). Also, in terms of both the Communicative function and Text Genre subdomains, 75% of the cohort scored below 60% and, with the exception of a few outliers, the full cohort scored below the Proficient band in Text Genre. These results suggest that a substantial proportion of this cohort would face academic literacy difficulties in their studies and that they would need assistance in this regard.

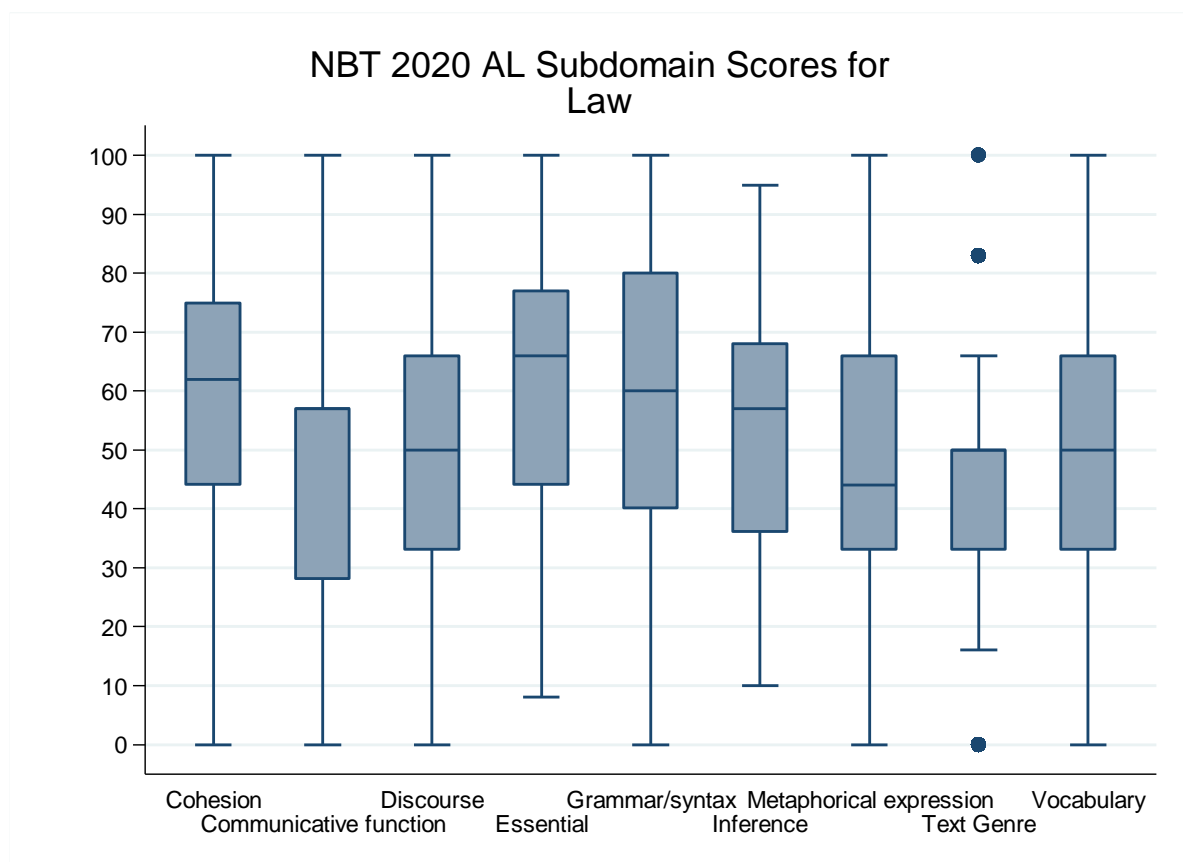


Figure 24 Law AL subdomain performance, NBT 2020

The NBT AL subdomain performance of candidates intending to enrol for Science/Mathematics is visually presented in Figure 42. The subdomains with the lowest median scores were Text Genre (50%), and Vocabulary (50%), and the largest proportion of the scores fall in the Intermediate band. Although it is at times mistakenly assumed that many of the Sciences and most of Mathematics are symbol-based and largely “language-free”, understanding mathematical and scientific discourse is dependent on a sound grasp of the language of instruction. The boxplots indicate that most of these students were not adequately prepared to cope with the academic literacy demands of Science/Mathematics study and that they would need relevant support in academic literacy to improve their chances of academic success.

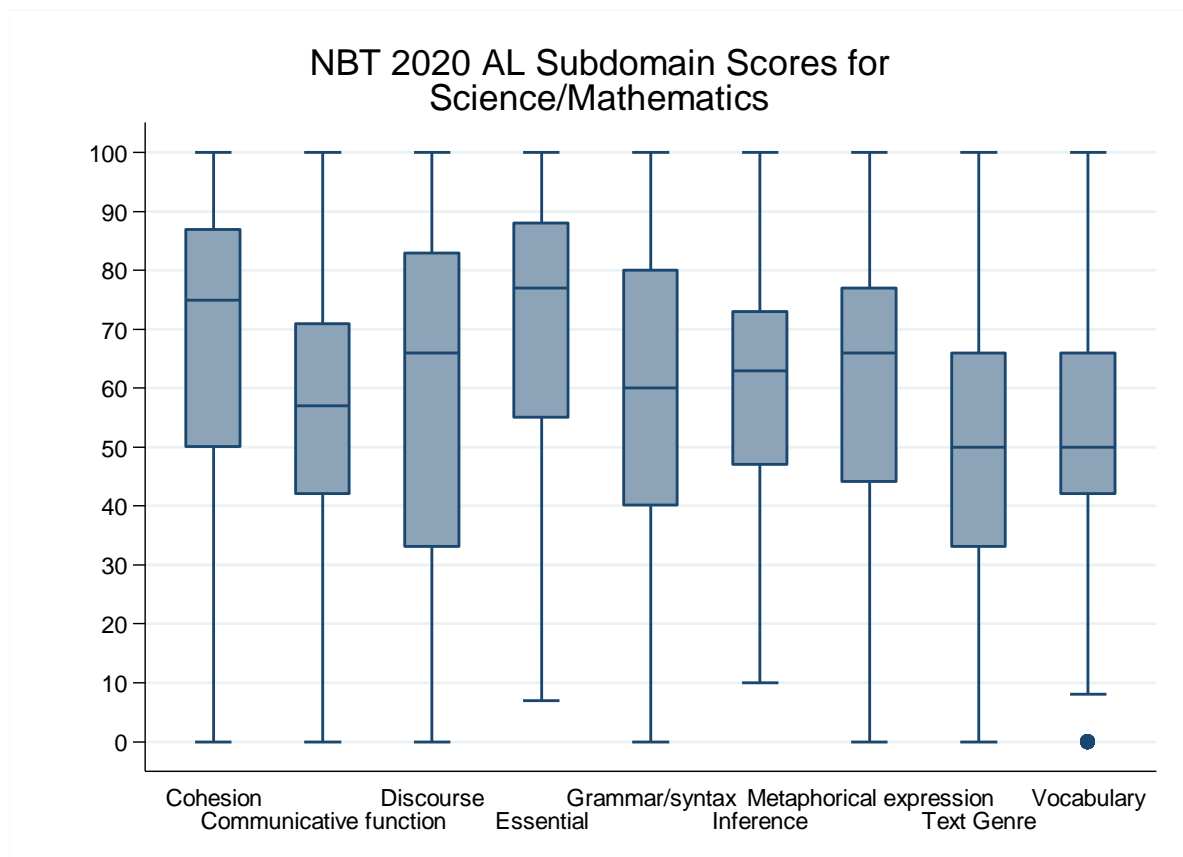


Figure 25 Science/Mathematics AL subdomain performance, NBT 2020

The NBT AL subdomain performance of candidates intending to enrol for programmes in faculties other than those we have mentioned, is visually presented in Figure 43. It is clear from this graph that the median scores in the Cohesion, Communicative function, Metaphorical expression, Text Genre and Vocabulary were all 50% or below. Also, apart from Cohesion, Essential/Non-Essential and Grammar/Syntax, 75% or more of the candidates scored below the Proficient band and in terms of Text Genre, almost the entire cohort scored below this performance band. The subdomains with the lowest median scores were Text Genre (50%), and Vocabulary (50%). The boxplots indicate that a large proportion of these students were not adequately prepared to cope with the academic literacy demands of higher education and although we cannot anticipate what their specific needs would be in terms of a broader discipline, it is clear that they would need relevant support in academic literacy to improve their chances of academic success.

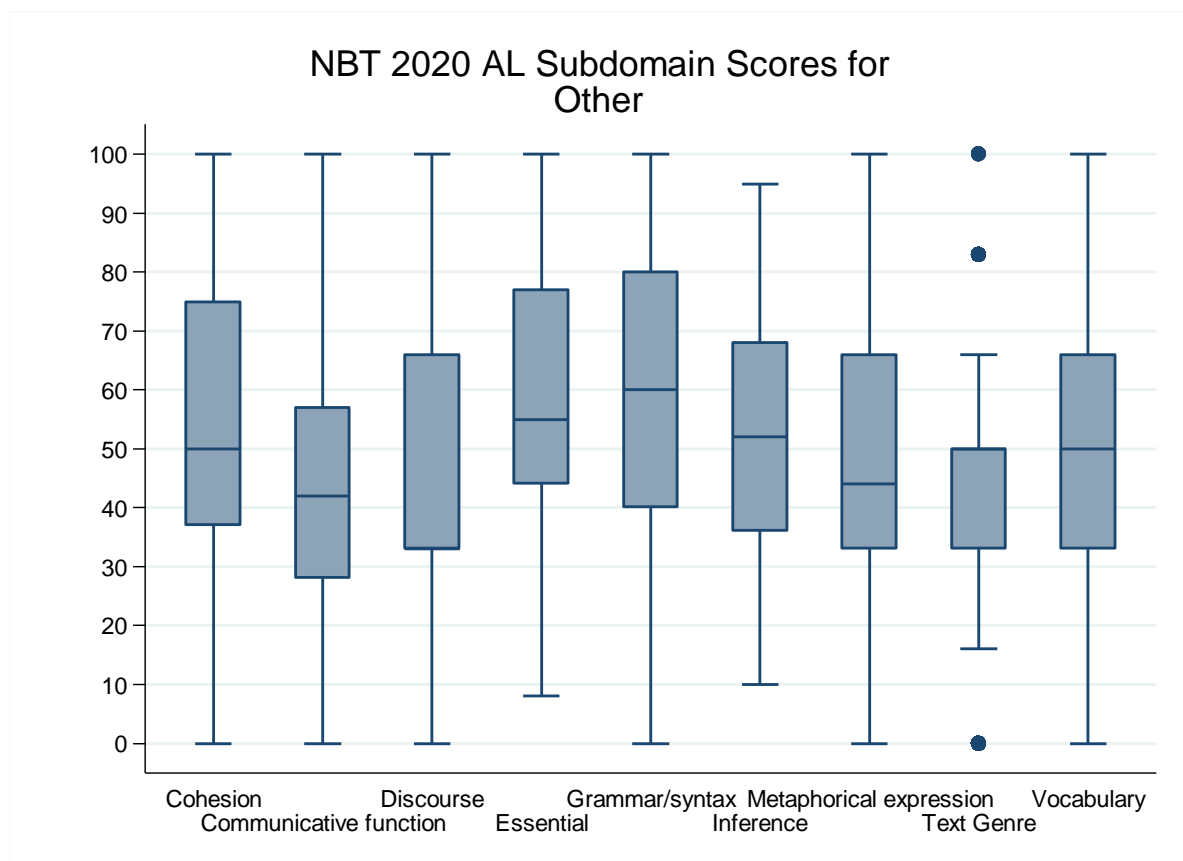


Figure 26 Other AL subdomain performance, NBT 2020

5.6.2 THE CONSTRUCT OF THE QL TEST

The definition of quantitative literacy that underpins the NBT QL test is as follows:

Quantitative literacy is the ability to manage situations or solve problems in practice, and involves responding to quantitative (mathematical and statistical) information that may be presented verbally, graphically, in tabular or symbolic form; it requires the activation of a range of enabling knowledge, behaviours and processes and it can be observed when it is expressed in the form of a communication, in written, oral or visual mode. (Frith and Prince, 2006:30)

The development of this definition was most strongly influenced by the definition of numerate behaviour underlying the assessment of numeracy in the Adult Literacy and Lifeskills (ALL) Survey (Gal, van Groenestijn, Manly, Schmitt & Tout, 2005:152) and the New Literacies Studies' view of literacy as social practice (Street, 2005; Street & Baker, 2006; Kelly, Johnston & Baynham, 2007). Lynn Steen (2004: 25) describes Quantitative Literacy as "QL is not a discipline but a literacy, not a set of skills but a habit of mind." He goes on to say that "...quantitative literacy is not really about [algorithmic abilities] but about challenging college-level settings in which quantitative analysis is intertwined with political, scientific, historical or artistic contexts. ..." The items in the Quantitative Literacy test are grouped into sub-domains according to the six main mathematical and statistical ideas dimension tested by the questions. Table 14 gives a description and specification of the mathematical and statistical ideas dimension of the construct tested by the QL test.

Table 14 Competency specification for the Quantitative Literacy test by Mathematical and Statistical Ideas

Skill Assessed	Description of skill
Quantity, number and operations.	<ul style="list-style-type: none">• The ability to order quantities, calculate and estimate the answers to computations required by a context, using numbers (whole numbers, fractions, decimals, percentages, ratios, scientific notation) and simple operations (+, -, ×, ÷, positive exponentiation) on them.• The ability to express the same decimal number in alternative ways (such as by converting a fraction to a percentage, a common fraction to a decimal fraction and so on)• The ability to interpret the words and phrases used to describe ratios (relative differences) between quantities within a context, to convert such phrases to numerical representations, to perform calculations with them and to interpret the result in the original context. The ability to work similarly with ratios between quantities represented in tables and charts, and in scale diagrams.
Shape, dimension and space.	<ul style="list-style-type: none">• The ability to understand the conventions for the measurement and description (representation) of 2- and 3-dimensional objects, angles and direction,• The ability to perform simple calculations involving areas, perimeters and volumes of simple shapes such as rectangles and cuboids.
Relationships, pattern, permutation	<ul style="list-style-type: none">• The ability to recognize, interpret and represent relationships and patterns in a variety of ways (graphs, tables, words and symbols)• The ability to manipulate simple algebraic expressions using simple arithmetic operations.

Change and rates	<ul style="list-style-type: none"> • The ability to distinguish between changes (or differences in magnitudes) expressed in absolute terms and those expressed in relative terms (for example as percentage change) • The ability to quantify and reason about changes or differences. • The ability to calculate average rates of change and to recognise that the steepness of a graph represents the rate of change of the dependent variable with respect to the independent variable. • The ability to interpret curvature of graphs in terms of changes in rate.
Data representation and analysis	<ul style="list-style-type: none"> • The ability to derive and use information from representations of contextualised data in tables (several rows and columns and with data of different types combined), charts (pie, bar, compound bar, stacked bar, 'broken' line, scatter plots) graphs and diagrams (such as tree diagrams) and to interpret the meaning of this information. • The ability to represent data in simple tables and charts, such as bar or line charts.
Chance and uncertainty	<ul style="list-style-type: none"> • The ability to appreciate that many phenomena are uncertain and to quantify the chance of uncertain events using empirically derived data. This includes understanding the idea of taking a random sample. • The ability to represent a probability as a number between 0 and 1, with 0 representing impossibility and 1 representing certainty.

The boxplots that follow reflect information regarding the candidates of the NBT QL test in the 2020 intake year. The candidates were asked to indicate their first choice for field of study and the associated faculty at the institution at which they wished to study. The boxplots are for the eleven faculties (with a twelfth graphic for applicants who indicated “Other” as their faculty choice) and show the distributions of candidates’ scores on different subdomains of questions in the Quantitative Literacy test.

The candidates who intended to study in the Allied Healthcare and Nursing faculty fared consistently poorly across the six competency areas (subdomains). The boxplots in Figure 44 indicate that the median scores varied across the six competence areas, ranging between 30% and 40% except for Chance and Uncertainty which has few items in the tests. The median scores for the subdomains fall within the Basic performance band. For the Quantity, number and operations subdomain, there is a large tail of outliers indicating the few candidates obtaining scores between 60% - 96%. This large tail is an indication of a skewed distribution with the majority of candidates performing poorly and a few candidates (outliers) falling within the Proficient band. In most academic programmes in the Allied Healthcare/Nursing faculty, the content is dependent on competency in QL and candidates would need to be quantitatively literate. Candidates would benefit from QL interventions that are geared specifically to Allied Healthcare and Nursing courses.

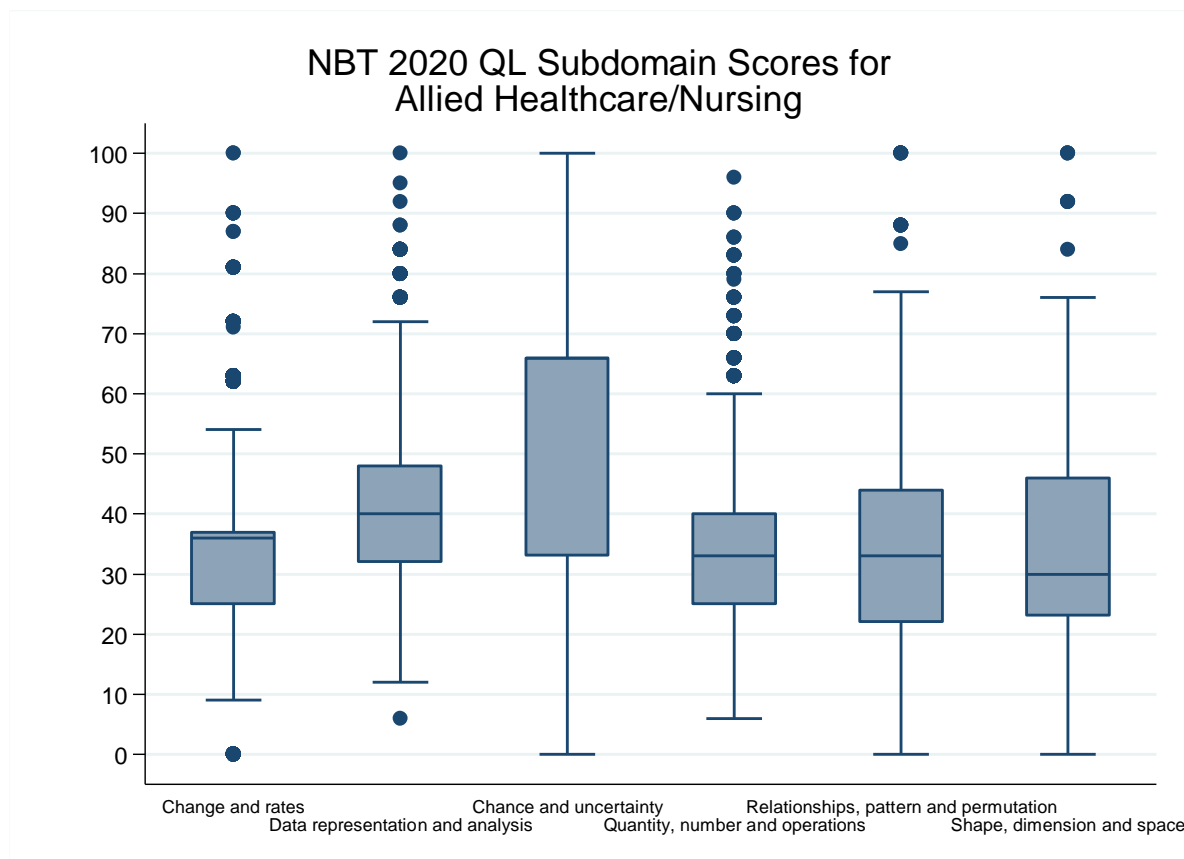


Figure 27 Allied Healthcare and Nursing subdomain QL performance, NBT 2020

For the candidates who indicated that they intended to study Art and Design, QL performance on the subdomains ranged between 33% - 44%, except for Chance and Uncertainty which has few items in the tests, which falls within the Basic and Lower Intermediate performance bands. The spread of scores in the box for the Chance and uncertainty subdomain is larger than that in the other boxes, indicating that 50% of the scores fall within this range. Shape, dimension and space, and Relationships, pattern and permutation are aspects of quantitative literacy that candidates in this faculty may be required to know. Interventions should take this into account.

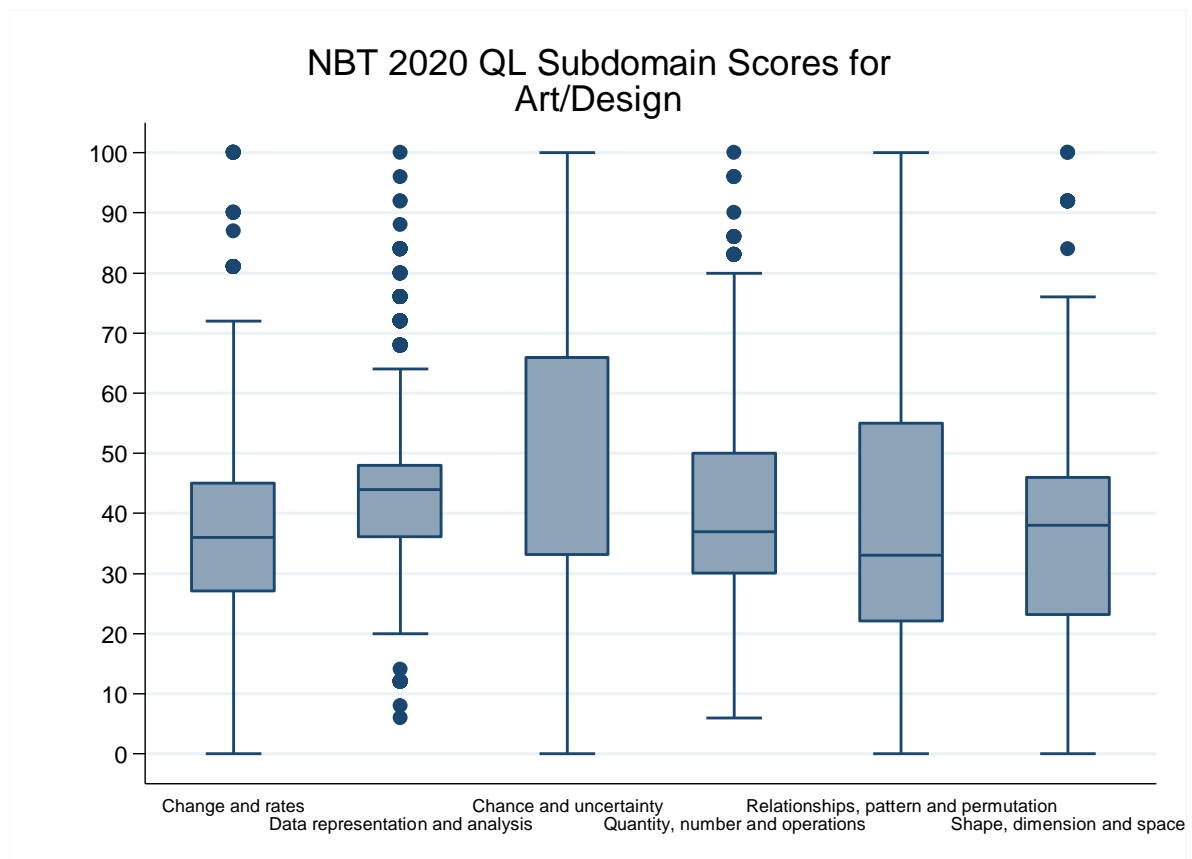


Figure 28 Art and Design subdomain QL performance, NBT 2020

The QL performance for candidates applying to the Business/Commerce and Management faculty was a slight improvement from the subdomain performance in the previous faculties. The medians for the six subdomains range between 38% and 48%, except for Chance and Uncertainty which has few items in the tests, and all fall within the Intermediate performance band. In this faculty, a large component of the coursework deals with aspects of Change and rates, Chance and uncertainty, and Quantity, number and operations, and the fact that the medians are in the Lower and Upper Intermediate performance bands suggests that the candidates would be well served with QL support provided as part of their regular curriculum.

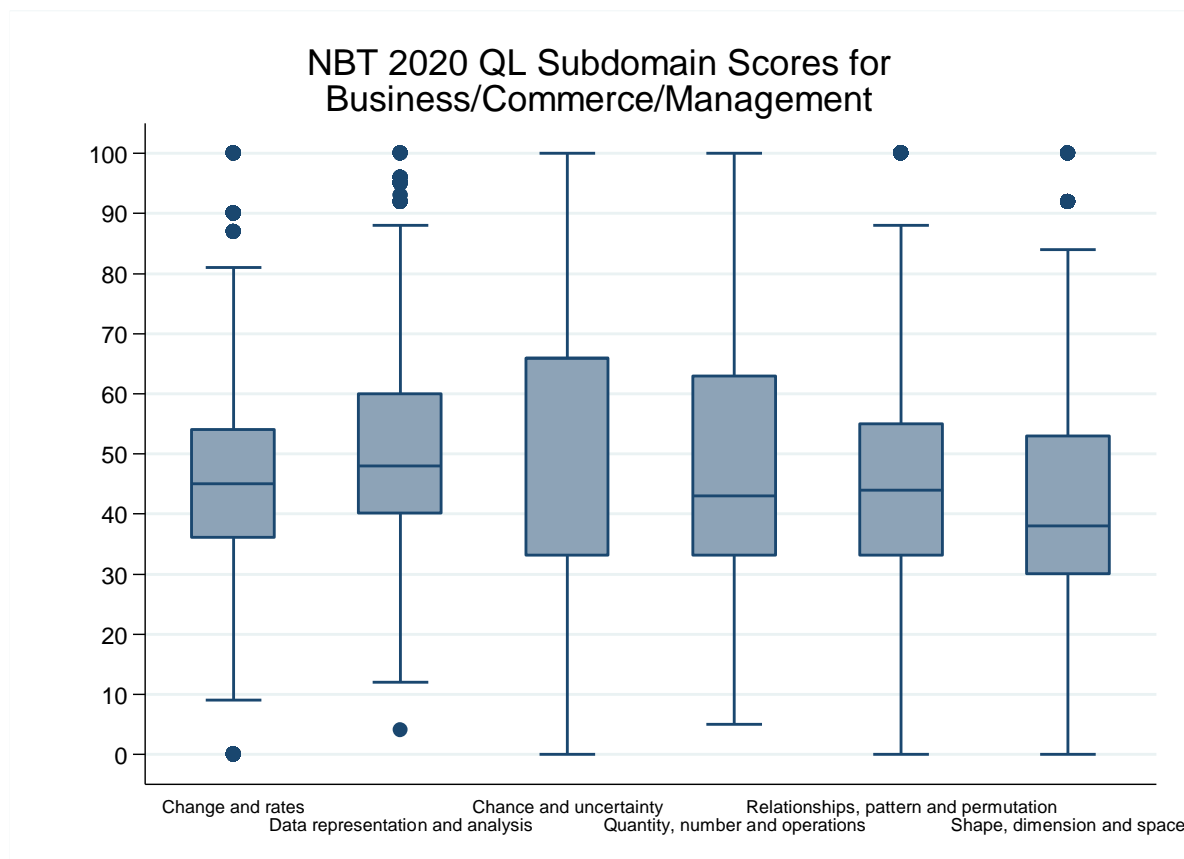


Figure 29 Business/Commerce and Management QL performance, NBT 2020

The QL performance of the Education candidates was very poor across the six subdomains and the medians were all in the Basic performance band. The median scores for candidates applying to this faculty range between 27% and 40% across the six subdomains except for Chance and Uncertainty which has few items in the tests. All subdomains are extremely relevant for all potential educators. Across most of the subdomains 75% or more of these candidates scored below 50%. The low median scores and large proportions scoring within the Intermediate band are an indication that the majority of the candidates would require extensive support in QL. If candidates teach any aspects of Mathematics, Geography, Biology or Science they will require targeted QL support relevant to their subjects during their training. Some courses may be less dependent on QL and candidates might be able to cope with the demands of tertiary education in this faculty without additional support.

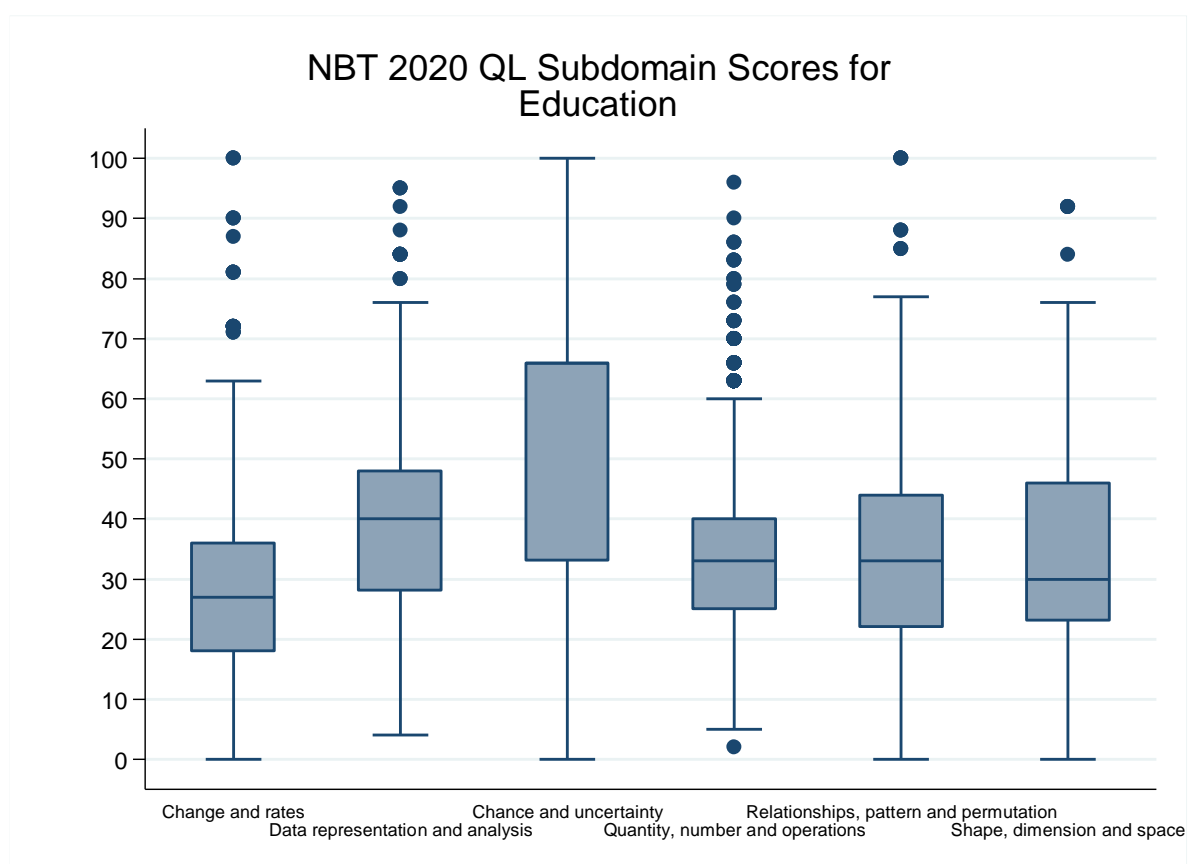


Figure 30 Education subdomain QL performance, NBT 2020

The QL performance of the candidates applying to the Engineering and Built Environment faculty was surprisingly low considering all the course content in this faculty is heavily dependent on mathematical and quantitative knowledge and skills. Across the six subdomains, the median scores were between 44% and 48% except for Chance and Uncertainty (66%) which has few items in the tests, placing them within the Intermediate performance band. Candidates intending to study in this faculty would need a good understanding of all six subdomains, as a large component of the work in this faculty involves calculations and manipulation of numbers. The performance across the six subdomains indicate that many candidates will require extensive QL support to cope with the heavily mathematical and quantitatively demanding courses they will study.

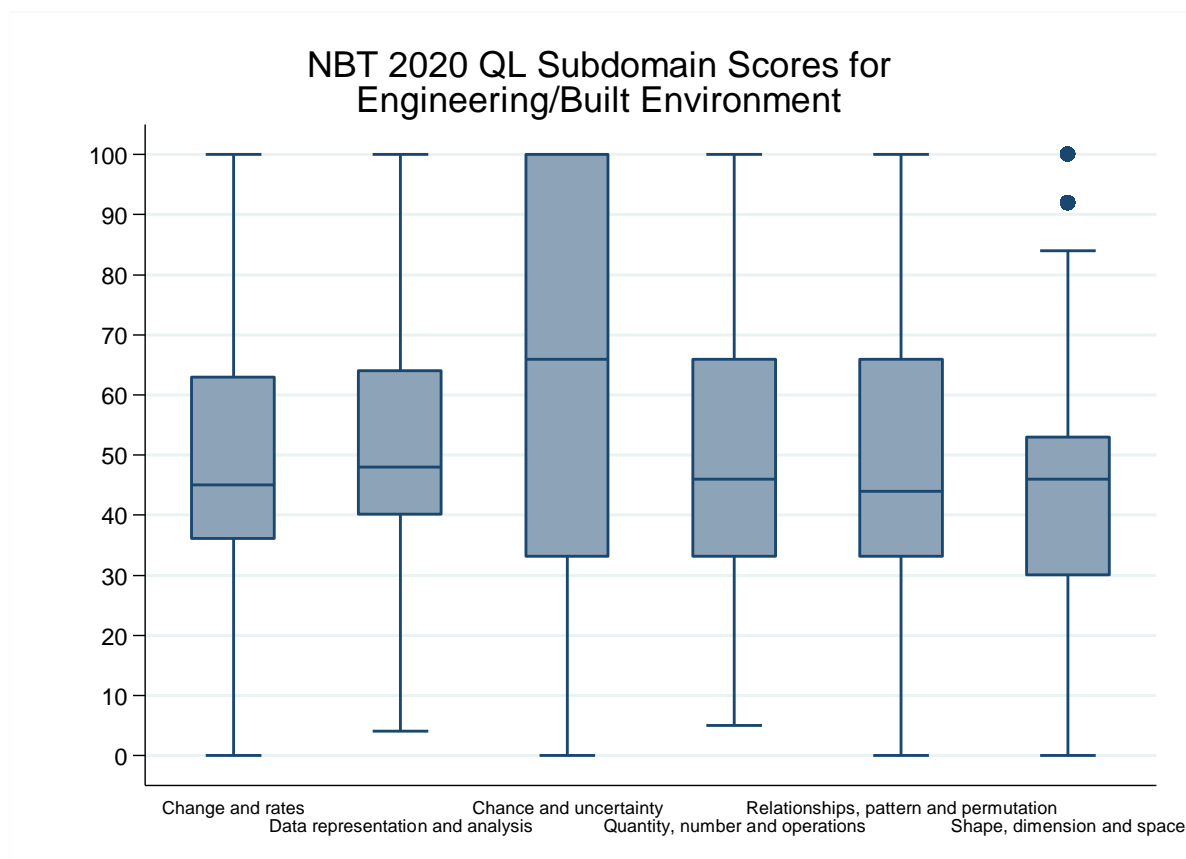


Figure 31 Engineering and Built Environment QL subdomain performance, NBT 2020

For the Health Sciences faculty, the median scores across the six subdomains ranged between 37% and 48% except for Chance and Uncertainty (66%) which has few items in the tests, which falls within the Intermediate performance band. The candidates' performance on the subdomain of Chance and uncertainty was the best for this group. The results for the six subdomains suggest that the majority of students in the Health Sciences faculty could benefit from QL support. Since this faculty includes interdisciplinary professions, quantitative literacy interventions could be aligned with their specific disciplinary needs. However, the results indicate that all Health Sciences students may benefit from generic QL interventions.

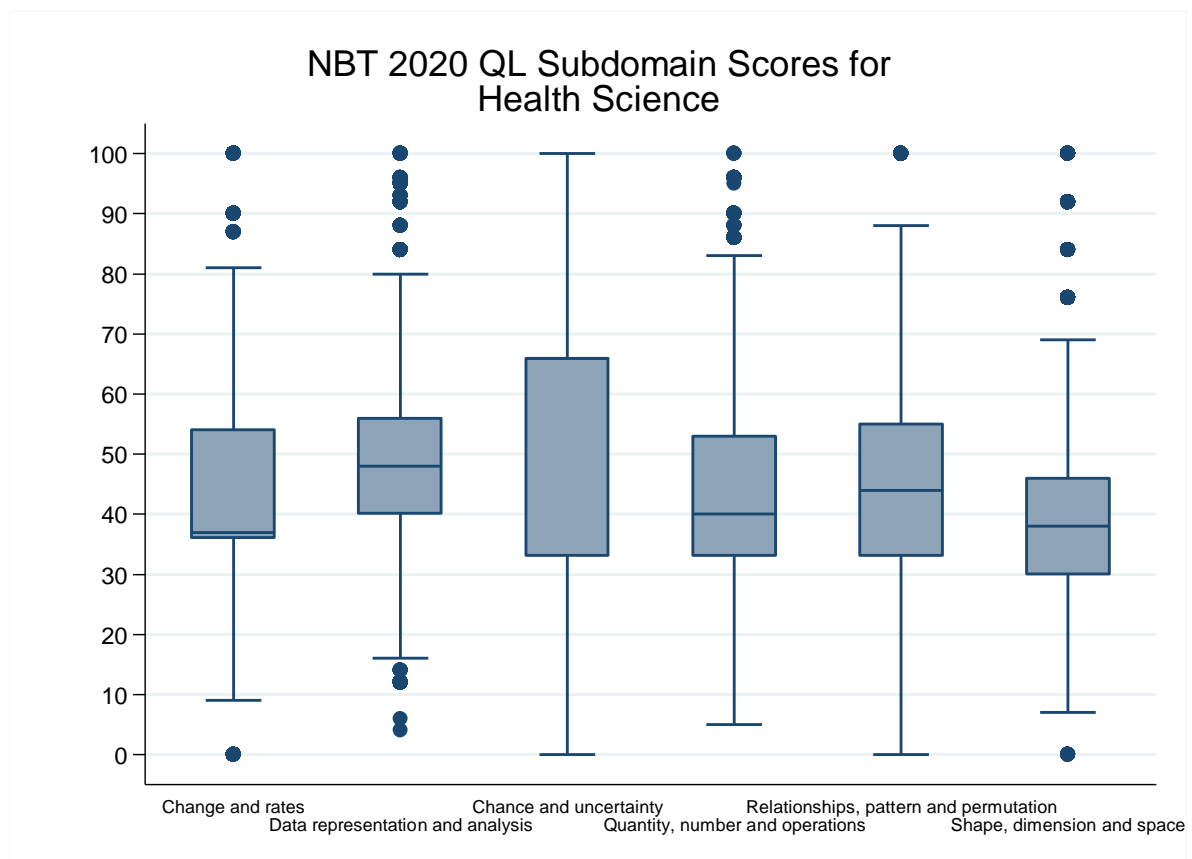


Figure 32 Health Sciences QL subdomain performance, NBT 2020

The median scores of the NBT QL candidates who indicated that they applied to the Hospitality and Tourism faculty ranged between 27% and 36% across the six subdomains except for Chance and Uncertainty (66%) which has few items in the tests. The medians for Change and rates, Quantity, number and operations and Relationships, pattern and permutation are in the Basic band; the remaining medians fall within the Intermediate performance band. Candidates in this faculty may be required to read graphs, charts and tables and hence the subdomain Data representation and analysis will be relevant for these candidates. This subdomain's median is 36% and the 3rd quartile point is 44%. While some candidates in this faculty may not need extensive QL support, for those whose courses comprise various aspects of QL, some specifically targeted support will be beneficial.

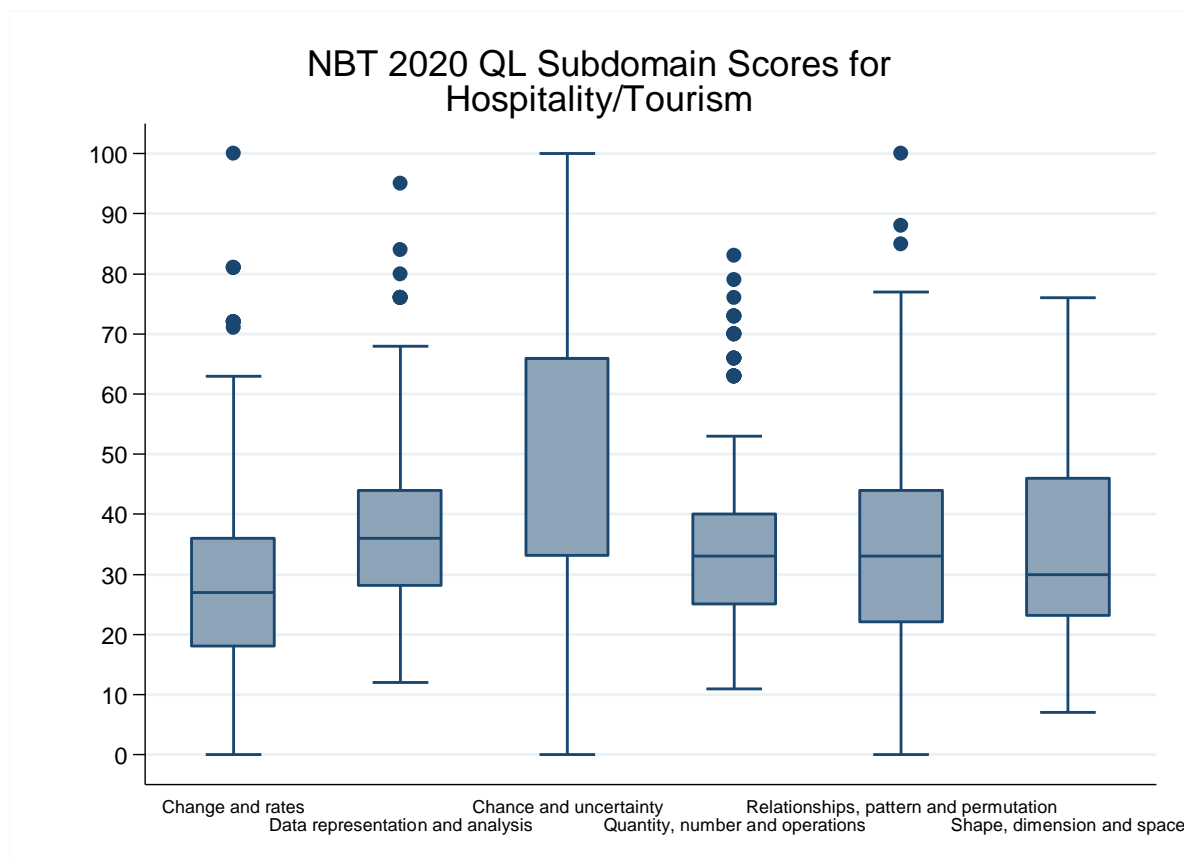


Figure 33 Hospitality and Tourism QL subdomain performance, NBT 2020

The median scores across the subdomains for the Humanities faculty range between 33% and 40% except for Chance and Uncertainty (66%) which has few items in the tests. The medians for Change and rates, and Quantity, number and operations, and Relationship, pattern and permutation fall at or within the Basic performance band; the medians in the remaining subdomains are all in the Lower Intermediate band. Some departments in this faculty may have a large proportion of work that requires quantitative reasoning and the performance across the six subdomains suggests that for these candidates, targeted support will be necessary. The candidates performed slightly better on the subdomain Chance and uncertainty with a median score of 66% (still in the Intermediate Lower band).

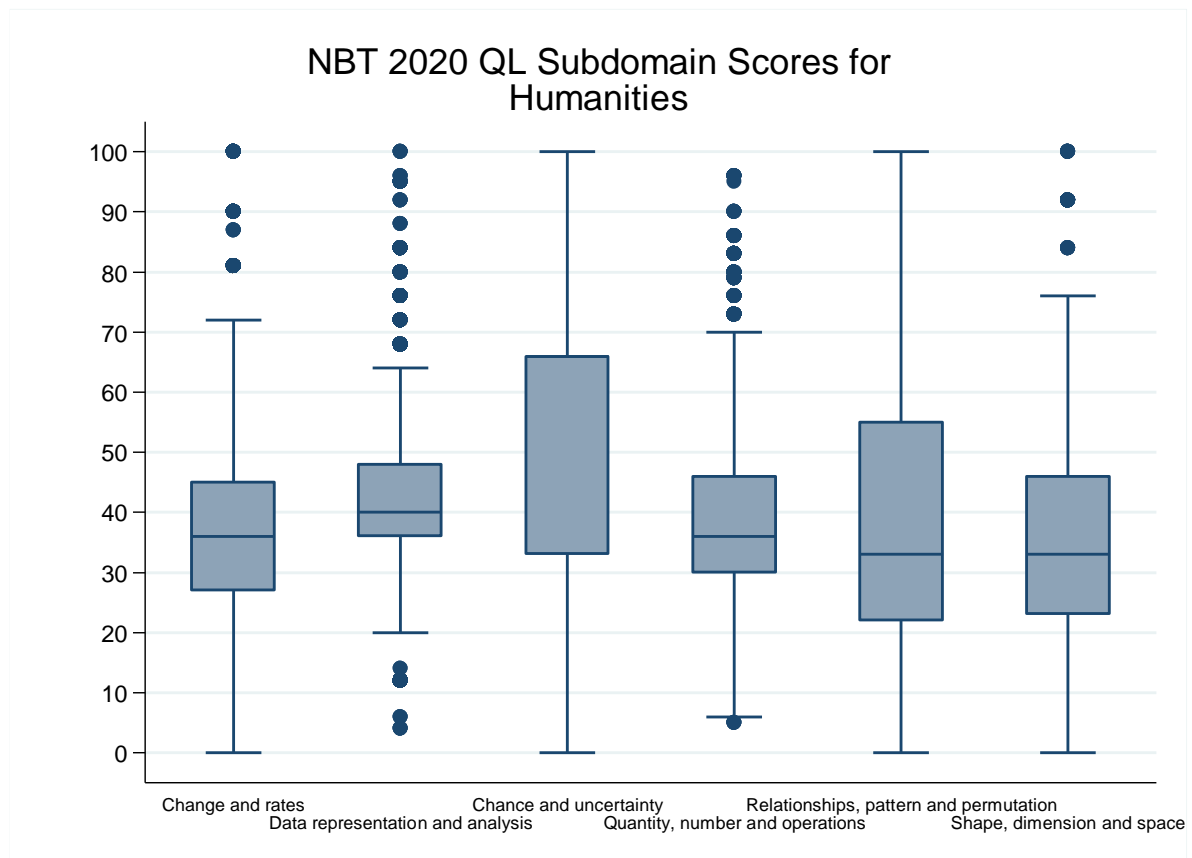


Figure 34 Humanities QL subdomain performance, NBT 2020

The QL performance of the candidates applying to study ICT is surprisingly low considering that the courses in this faculty are heavily dependent on QL. Candidates in this faculty are expected to have good mathematical and quantitative reasoning skills, as most of the courses require computations and quantitative manipulations. The median scores across the subdomains ranged between 36% and 44% with the subdomain Chance and uncertainty being 66% and the medians for the other five subdomains well below 50%. The subdomain Change and rates had the lowest performance, with a median of 36%. Many of these candidates would benefit from support or interventions in QL in order to meet the required quantitative demands of their courses.

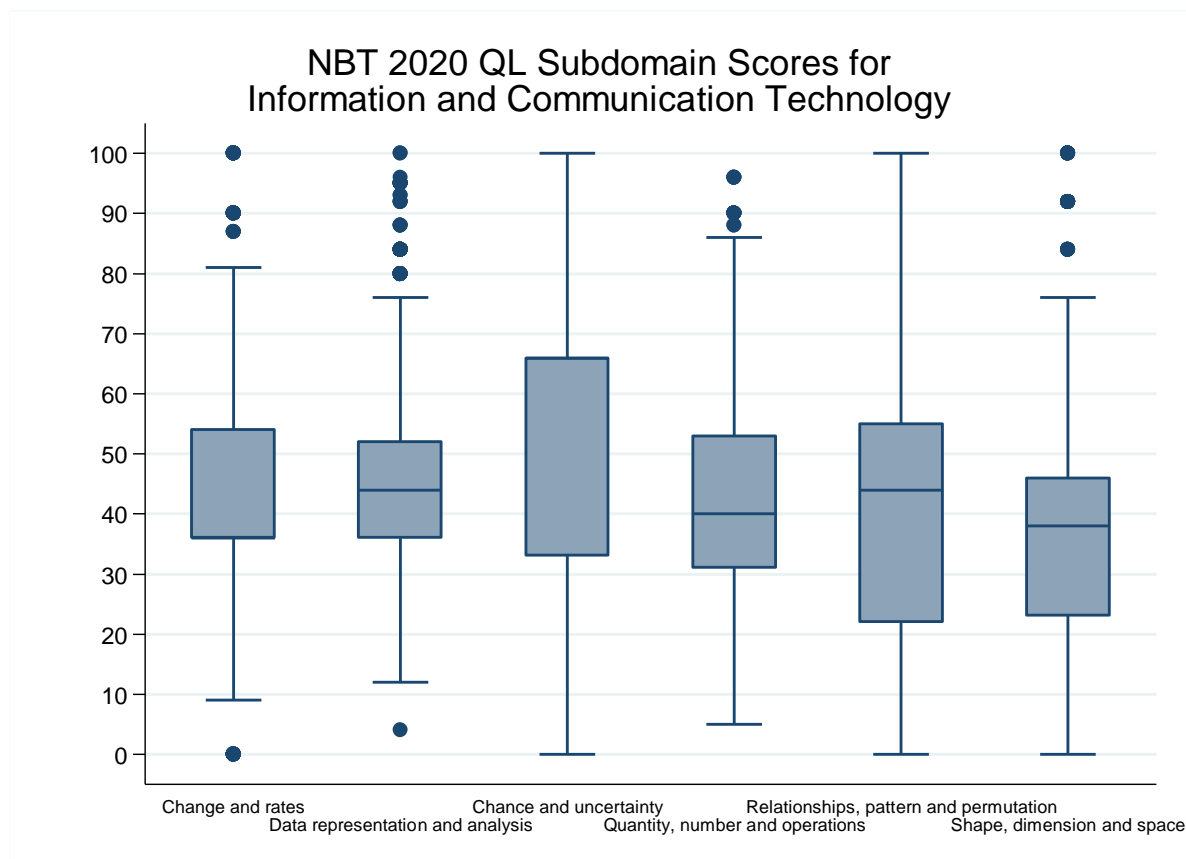


Figure 35 Information and Communication Technology QL subdomain performance, NBT 2020

The median scores across the subdomains for the Law faculty ranges between 30% and 40% except for Chance and Uncertainty (66%) which has few items in the tests. The medians for all subdomains are in the Basic band. Students studying in this faculty may have a large proportion of work that requires quantitative reasoning and the performance across the six subdomains suggests that for these candidates, targeted support will be necessary. The candidates performed slightly better on the subdomain Chance and uncertainty with a median score of 66% (still in the Intermediate Upper band).

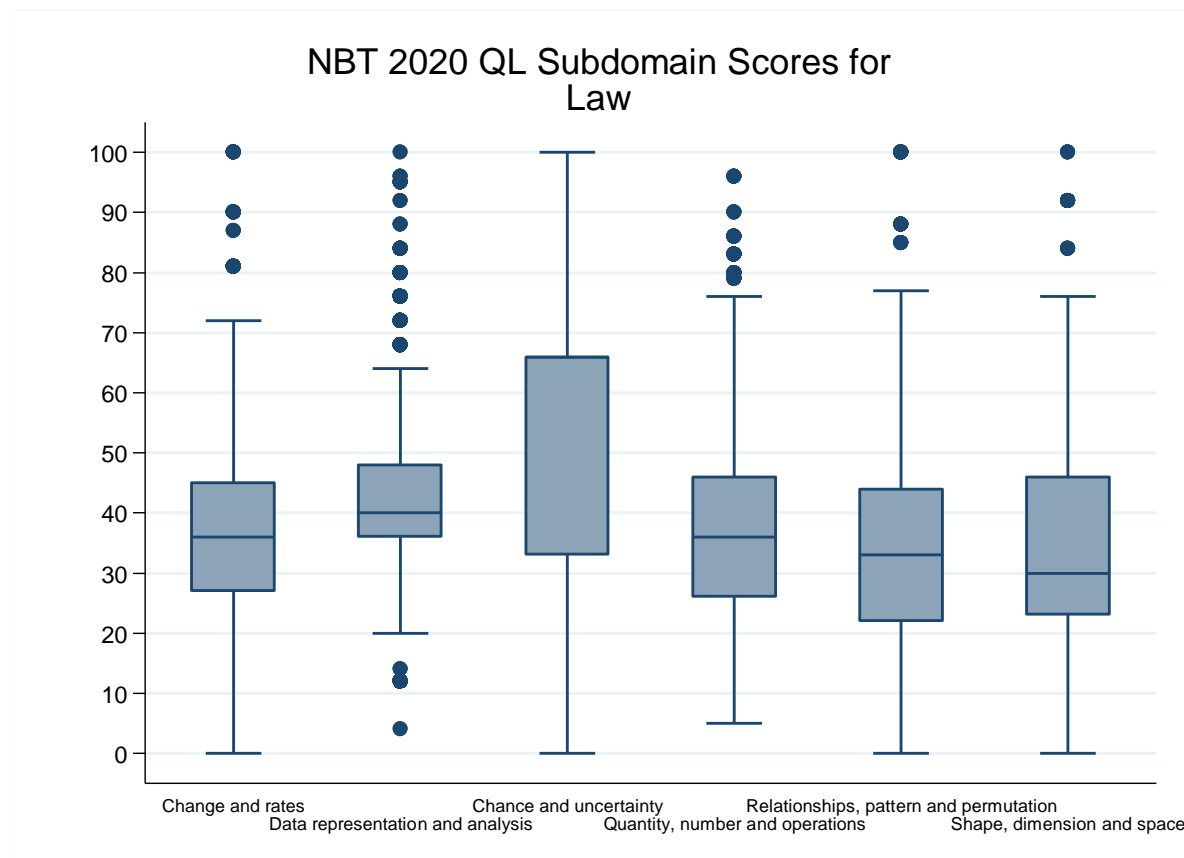


Figure 36 Law QL subdomain performance, NBT 2020

The performance for candidates in the Science/Mathematics faculty is rather concerning. The course content in these faculties is heavily dependent on quantitative reasoning, mathematical knowledge and skills. Candidates will be doing mathematical computations and manipulations and basic foundational competence in mathematics is required, as well as a thorough grasp of all aspects of QL. The median scores ranged between 44% and 53% except for Chance and Uncertainty (66%) which has few items in the tests. The medians for the subdomains Change and rates (45%), and Relationships, pattern and permutation (44%) are particularly low. These candidates will need a good grounding in quantitative skills, knowledge and understanding in order to meet the demands of tertiary Science or Mathematics courses. These candidates are likely to require extensive QL support relevant to their academic studies.

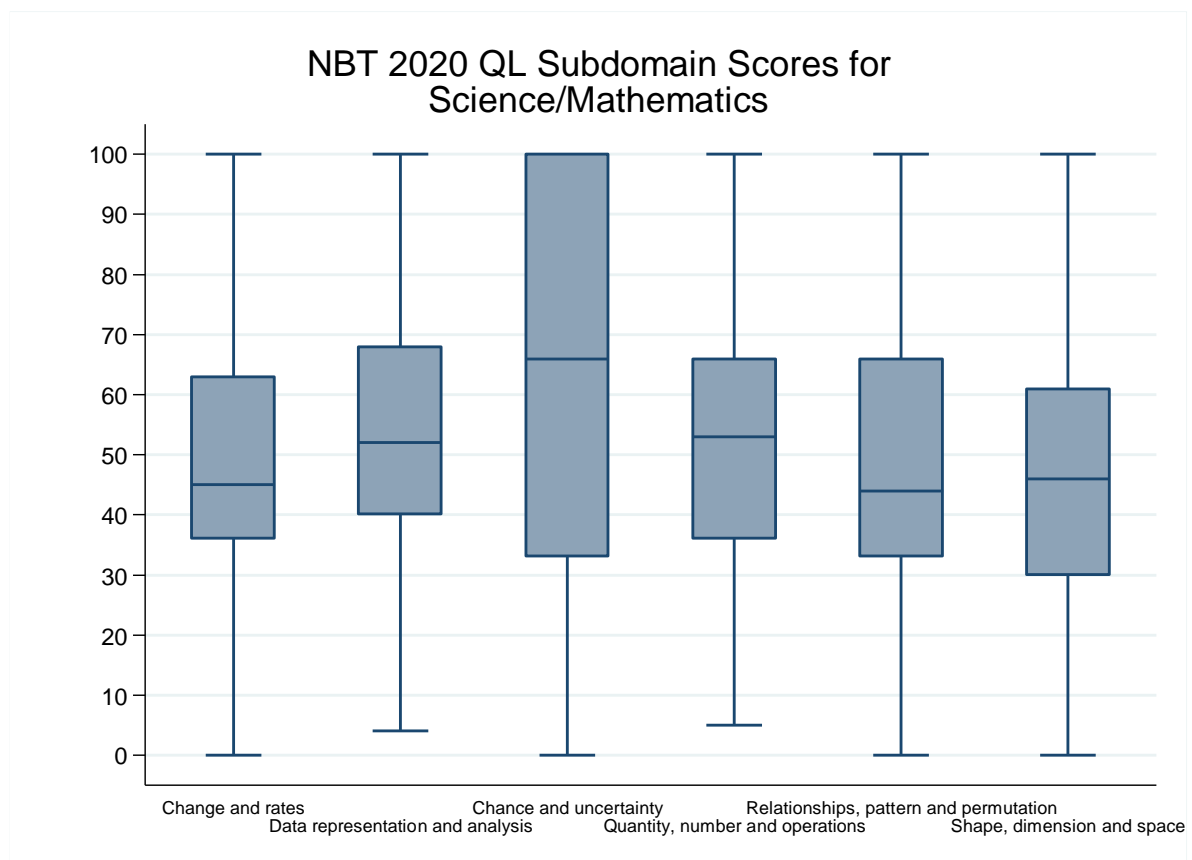


Figure 37 Science and Mathematics QL subdomain performance, NBT 2020

The QL performance of the “Other” candidates, meaning those candidates who did not indicate the faculty in which they will study, was very poor across the subdomains and the medians were all in the Intermediate Lower performance band. The median scores for these candidates range between 33% and 36% across the subdomains except for Chance and Uncertainty (66%) which has few items in the tests. The relatively low median scores are an indication that the majority of the candidates would require extensive support in QL if quantitative skills are needed in their courses. Some courses may be less dependent on QL and candidates might be able to cope with the demands of tertiary education in those courses without additional support.

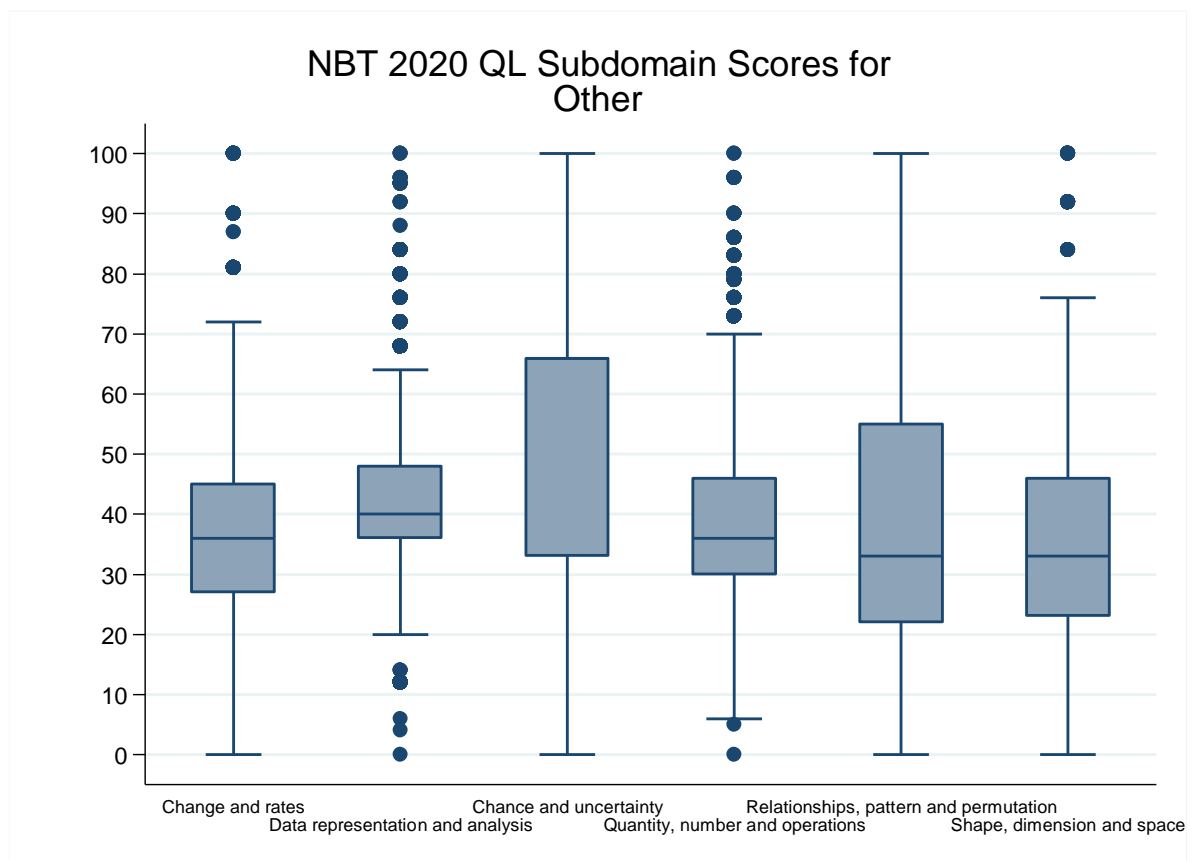


Figure 38 "Other" QL subdomain performance, NBT 2020

5.6.3 THE CONSTRUCT OF THE MAT TEST

The boxplots that follow later in this section reflect information from the candidates who wrote the NBT MAT test in 2020. The candidates were asked to indicate their first choice for field of study and the associated faculty at the institution they wish to study. Eleven faculties are reflected. The boxplots show the distributions of student scores on different subdomains of questions in the Mathematics test.

The content of the MAT test is embedded in the NSC Mathematics curriculum (the CAPS, taking into account the pace-setter guidelines for teaching), but aligned with first year mainstream needs (content selected in consultation with academics teaching courses requiring mathematics). The MAT test specification comprises items which are distributed over six competence areas, subdivided into different sub-areas, and categorised according to cognitive level. For teaching and learning diagnostic purposes, different aspects are grouped together into five subdomains. The subdomains are Algebraic processing, Number sense, Functions and graphs, Trigonometric functions and graphs, and Geometric reasoning. It should be noted that the MAT subdomains Number sense and Geometric reasoning are associated with the QL subdomains Quantity, number and operation, and Shape, dimension and space, but are essentially different, especially in the sense that for QL no specific school curriculum knowledge is required, whereas the MAT subdomains are integrally related to the CAPS.

The NSC exam (school exit, norm-referenced) and NBT (university entry, criterion-referenced) are complementary but different forms of assessment. Not all school topics are necessarily tested in the MAT tests. The focus is on the areas that have most significance for first year mathematics courses.

The patterns of performance in the subdomains differ across faculties, with lower performance in the faculties of Art and Design, Humanities, Law and Education. In all cases the median values lie in the Lower Intermediate or in the Basic band, indicating a need for support in all mathematical subdomain areas for most students.

This analysis can also be done for a particular cohort of students (e.g. all those registered for a specific module), giving lecturers a useful tool for aligning their teaching with the needs of their students. The subdomain analysis for the various faculties gives an indication of the degrees of difficulty experienced within the different subdomains. This analysis highlights the subdomains in which prospective students may experience challenges when faced with mathematical courses and modules at university. An understanding of the difficulties that students/learners experience can improve teaching and learning practices at university; it can also aid educators at schools to change, adapt or improve their teaching strategies.

In a large number of institutions worldwide, for many years there has been an increased focus on preparatory, introductory or other support courses in Mathematics. In 1996 Hillel (see Hillel, 1996, in Mamona-Downs & Downs, 2002) noted that

“The problem of the mathematical preparation of incoming students, their different socio-cultural background, age, and expectations is evidently a worldwide phenomenon. The traditional image of a mathematics student as well prepared, selected, and highly motivated simply doesn’t fit present-day realities. Consequently, mathematics departments find themselves with a new set of challenges” (p. 166).

Central to the issues of teaching and learning mathematics is the idea that mathematics has to be learnt

through active engagement (Mason, 2002). The sub-domain information facilitates both prospective students' and lecturers' active engagement with the mathematical content they will need to deal with.

Table 15 Mathematics subdomains assessed, NBT 2020

Skill assessed	Explanation of skill area
Algebraic processes	<ul style="list-style-type: none"> • Pattern recognition, sequences and series, use of sigma notation. • Operations involving relationships such as ratios and percentages. • Modelling situations by making use of mathematical process skills (translation from language to algebra, solution of problems). • Operations involving surds, logarithms and exponents, including solution of exponential equations. • Financial calculations (compound interest, appreciation, future value, etc.). • Number sense – manipulations/simple calculations involving integers, rational and irrational numbers. • Algebraic manipulation (includes expressions, equations, inequalities, simplification, factorisation, completing the square).
Functions represented by graphs and equations; 'functions' to include linear, quadratic, hyperbola, cubic, exponential and logarithmic. Other graphs such as circles are also included.	<ul style="list-style-type: none"> • Comprehension of function notation, substitution, domain, range. • Function representation (algebraic and graphic); properties of functions and graphs (such as intercepts, turning points, asymptotes); relationship between graphs and their equations; interpretation of graphical information. • Transformations of graphs of the functions noted above; solution of related problems; inverses of functions. • Applications of principles of differential calculus and related problems involving simple linear, non-linear functions (i.e. critical points, increasing/decreasing functions, tangents); interpretation of behaviour of function from derivative and vice versa.
Basic trigonometry, including graphs of trigonometric functions, problems requiring solutions of trigonometric equations and application of trigonometric concepts.	<ul style="list-style-type: none"> • Definitions of trigonometric ratios (sine, cosine, tangent). • Characteristics and interpretations of trigonometric functions and their graphs (e.g. domain, range, period, amplitude), including transformations of trigonometric functions. • Solving of trigonometric equations and using identities; simplification of trigonometric expressions using identities and reduction formulae where necessary; special angles; compound and double angles. • Application of area, sine and cosine rules • Application of trigonometric concepts in solving problems, including two- and three-dimensional problems.
Spatial perception including angles, symmetries, measurements, representations and interpretation of two-dimensional and three-dimensional shapes.	<ul style="list-style-type: none"> • Geometric objects • Properties of 2D figures and 3D objects (such as the circle, rectangle, trapezium, sphere, cone, pyramid). • Scale factor • Perimeter, area, volume (also of composite figures and objects) • Analytic geometry (linking geometric and algebraic properties in the Cartesian plane). • Circle Geometry • Cyclic quadrilaterals

	<ul style="list-style-type: none"> Relationships between tangents, and chords, and angles in a circle
Data handling and probability	<ul style="list-style-type: none"> Measurement (and related interpretations). Representation (such as histograms, line graphs, pie charts, ogives, box-and-whisker plots) and related interpretations). Probability
Competent use of logical skills in making deductions and determining the validity of given assertions	

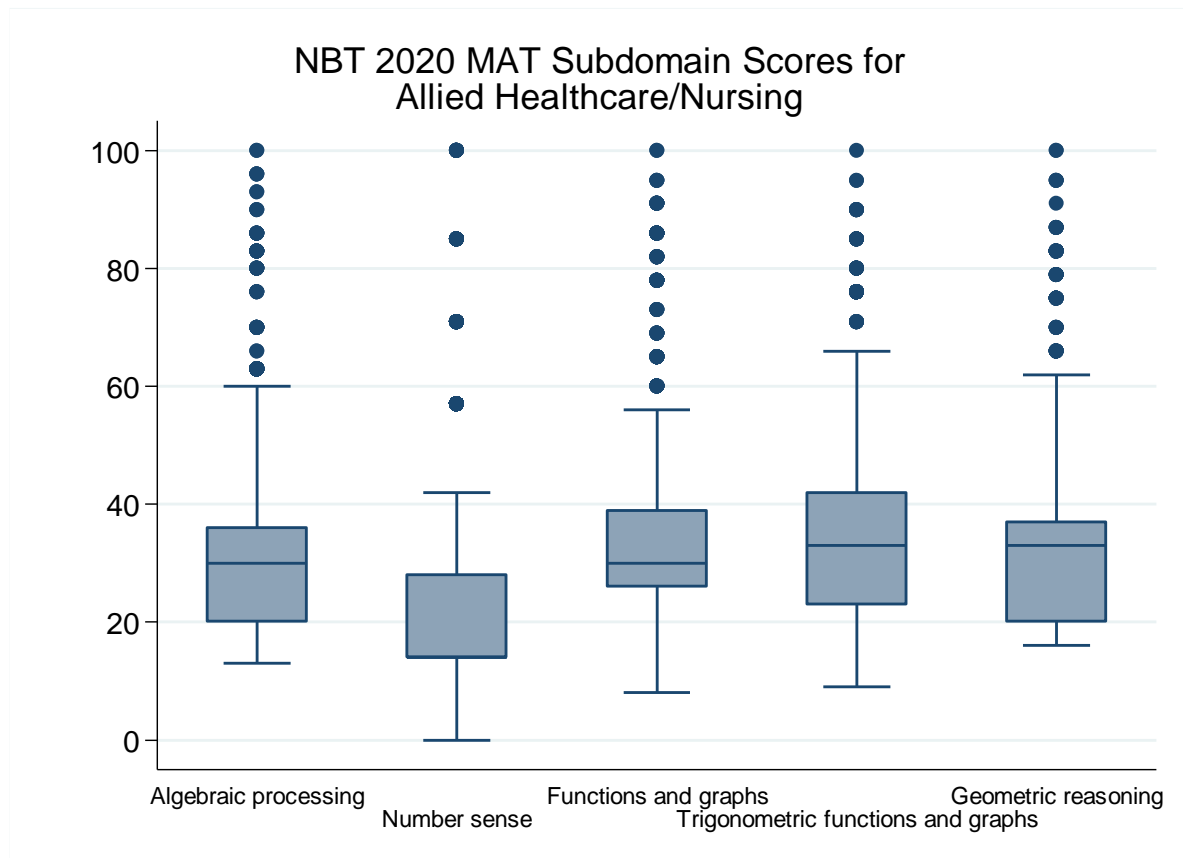


Figure 39 Allied Healthcare/Nursing MAT subdomain performance, NBT 2020

Some of the candidates who have applied to study in the area of the Allied Healthcare/Nursing may need to take Mathematics courses in order to study other subjects such as Physics, Chemistry and Biology. The boxplots show median scores of about 33% or less in all subdomains, i.e. in the Basic band. Also, across all the subdomains, 75% or more of the candidates scored below 42%. Apart from quite a large number of outliers in all subdomains other than Number sense, the scores are a matter of concern, and these applicants will need fairly extensive support in all subdomains.

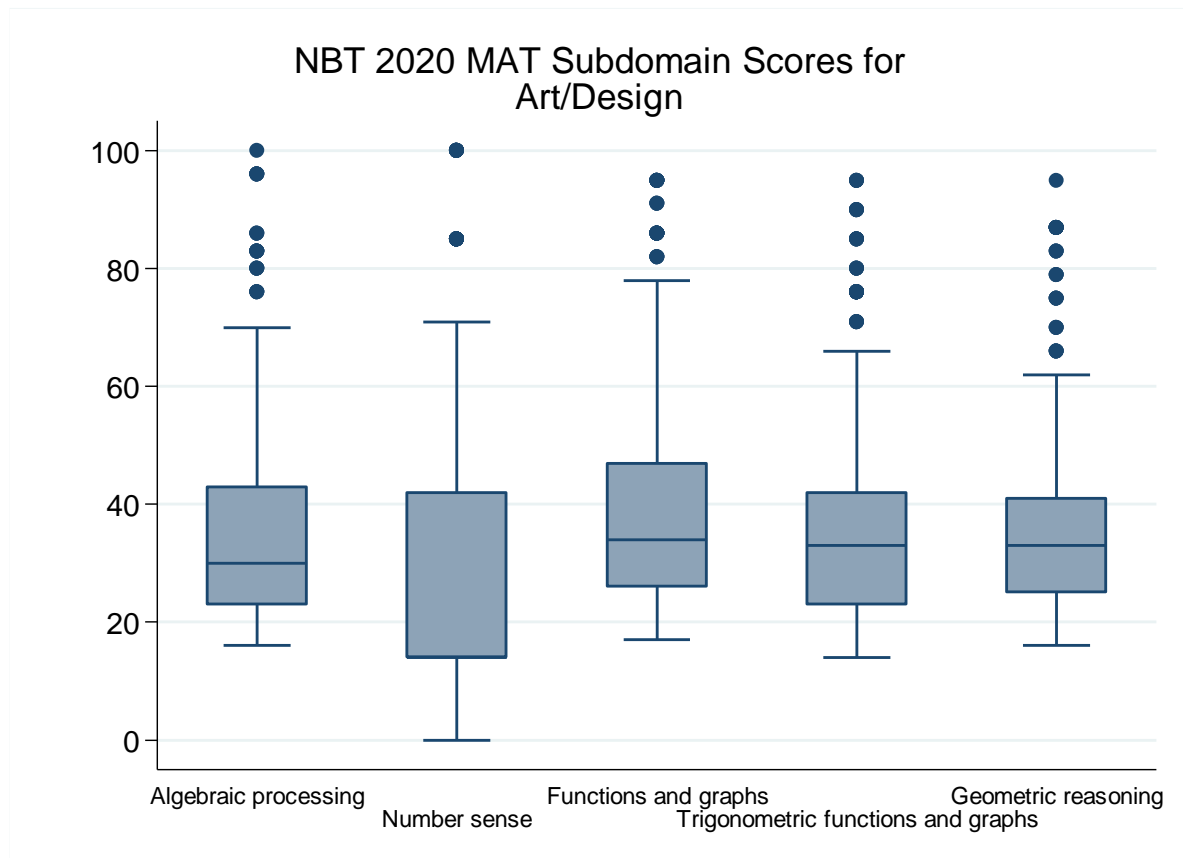


Figure 40 Art/Design MAT subdomain performance, NBT 2020

Applicants indicating the area of Art and Design as their first choice are unlikely to have taken NSC Mathematics; many may have taken Mathematical Literacy and would therefore not have been equipped to write the NBT MAT test. If this is the case, low scores in all subdomains represented in the boxplots should be interpreted with caution. It is however interesting that scores for this group are slightly higher than those for applicants to the Allied Healthcare/Nursing group.

The median scores of candidates who applied to study courses in Business, Commerce and Management were roughly 45% or less in all subdomains, i.e. in the Lower Intermediate band. Economics, in particular, is heavily dependent on the subdomains Algebraic processing, Number sense and Functions and graphs. Once registered in these courses, students will need considerable support in order to cope with the mathematical component of their studies.

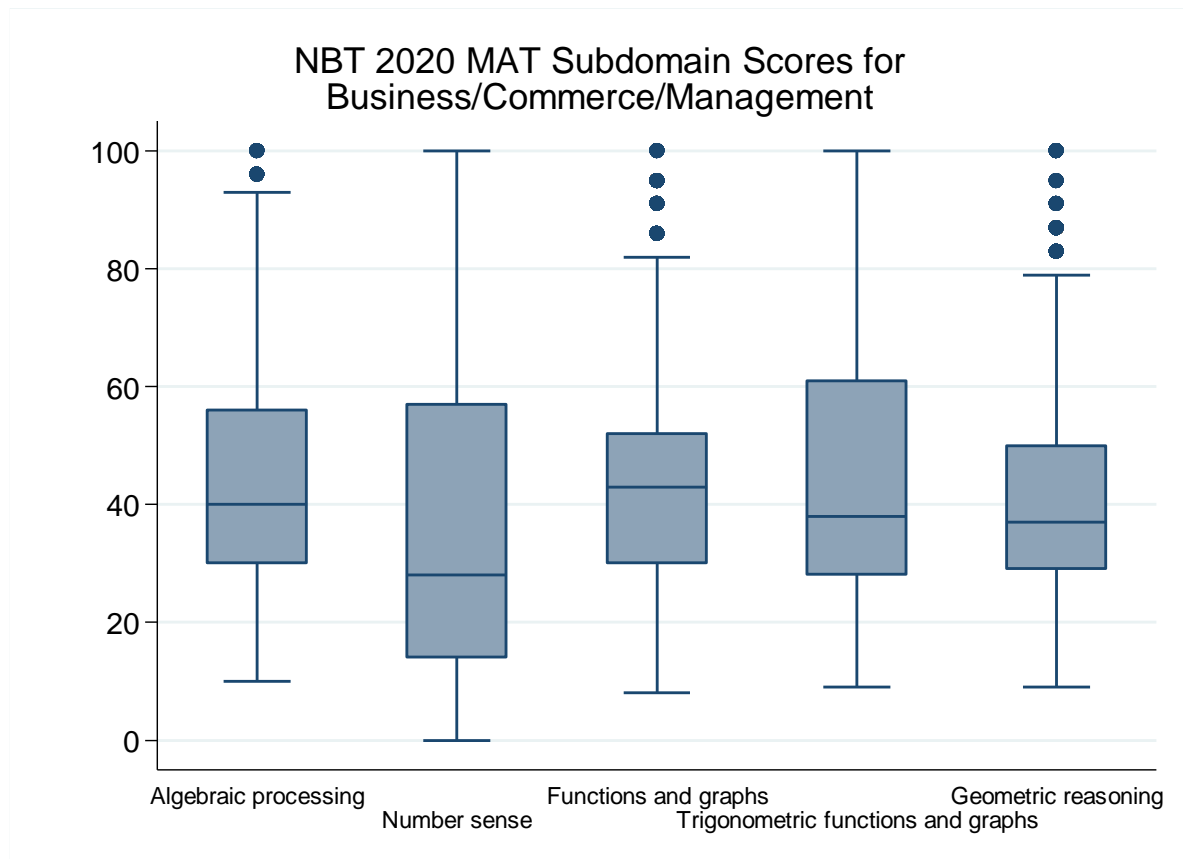


Figure 41 Business/Commerce/Management MAT subdomain performance, NBT 2020

The boxplots in Figure 59 below show the subdomain performance of those intending to study Education. These scores are generally low, with medians below 33% in the Basic band and more than 75% of scores falling below 42%. These candidates' content knowledge will therefore need extensive remediation.

One of the reasons that the Euclidean Geometry was removed from the NSC curriculum was that there were too few educators able to teach it. The CAPS now includes this topic, and the 2017 NBT MAT tests assessed this new work, which was examined for the first time in Grade 12 in 2014 and in the NBT MAT tests in 2015. The Geometric reasoning subdomain includes aspects such as analytical geometry, and properties of geometric objects, that were in the old curriculum and are still in the CAPS; it also includes circle geometry, since this is now in the CAPS. Poor performance in this area may be attributed to lack of teacher exposure to the topics that are new to the curriculum. Much thought and planning needs to be given to addressing the poor performance in this subdomain. Education faculties students (especially those planning to teach the Sciences and/or Mathematics) will need much support to develop comprehension and skill in all these subdomain areas before they will be able to fully comprehend the topics they will be studying and one day teaching.

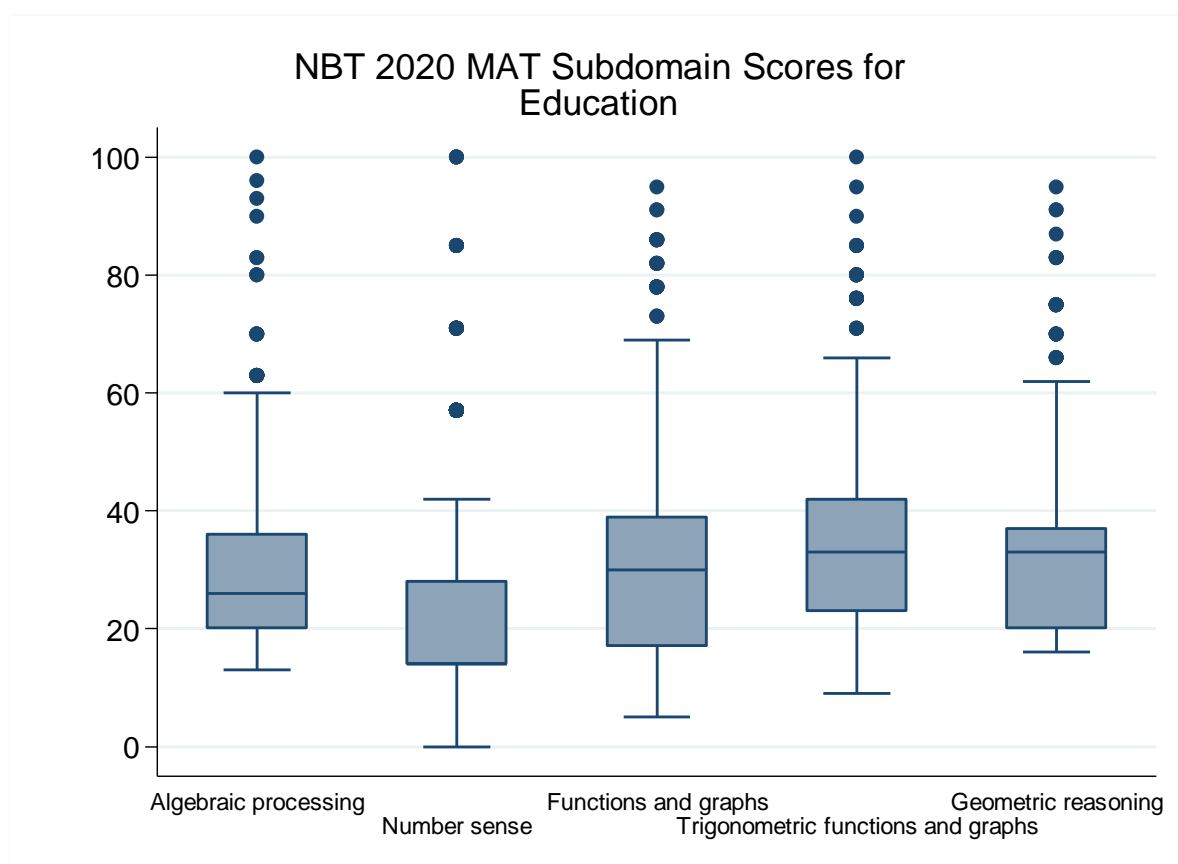


Figure 42 Education MAT subdomain performance, NBT 2020

The lack of outliers in the boxplots for all subdomains in the next figure shows that there was a greater spread of scores for those candidates who intended applying to the Faculty of Engineering and the Built

Environment. Median scores in all subdomains were however low (in the region of 49% or less, i.e. in the Lower Intermediate band). A third quartile score of roughly between 57% and 66% in all subdomains is a matter of concern: 75% of candidates applying to study courses which are heavily dependent on mathematics have NBT MAT subdomain scores that are below 66%. Mathematics is central to this area of study. Many of these candidates, if admitted to this area of study, will need extensive support in all subdomains. Considering the QL scores and MAT scores together, it seems that certain essential but missing building blocks in QL may be undermining mathematical performance; simultaneous and targeted support in both QL and MAT may be needed to address the problem.

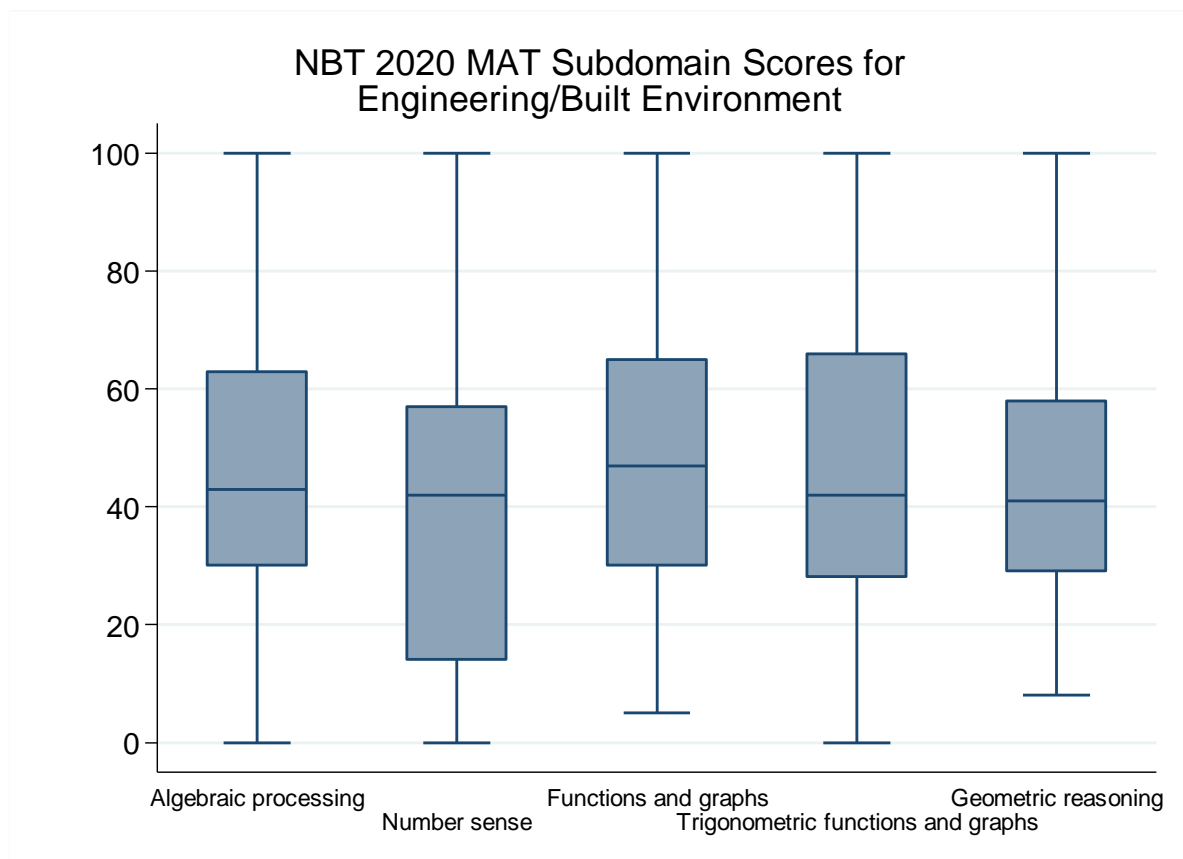


Figure 43 Engineering/Built Environment MAT subdomain performance, NBT 2020

The Health Sciences Consortium makes use of the NBTs in its selection programme. However, there are many more applicants than can be accommodated, and only the top performing candidates will be selected. Those candidates who do not end up in their intended field of study will enrol in other areas. If they enrol for Science degrees, or for any other programmes where mathematics is a requirement, they will need support in all subdomains. The boxplots below show that in all subdomains the medians are below 44% and in the Intermediate Lower band, indicative of substantial support requirements.

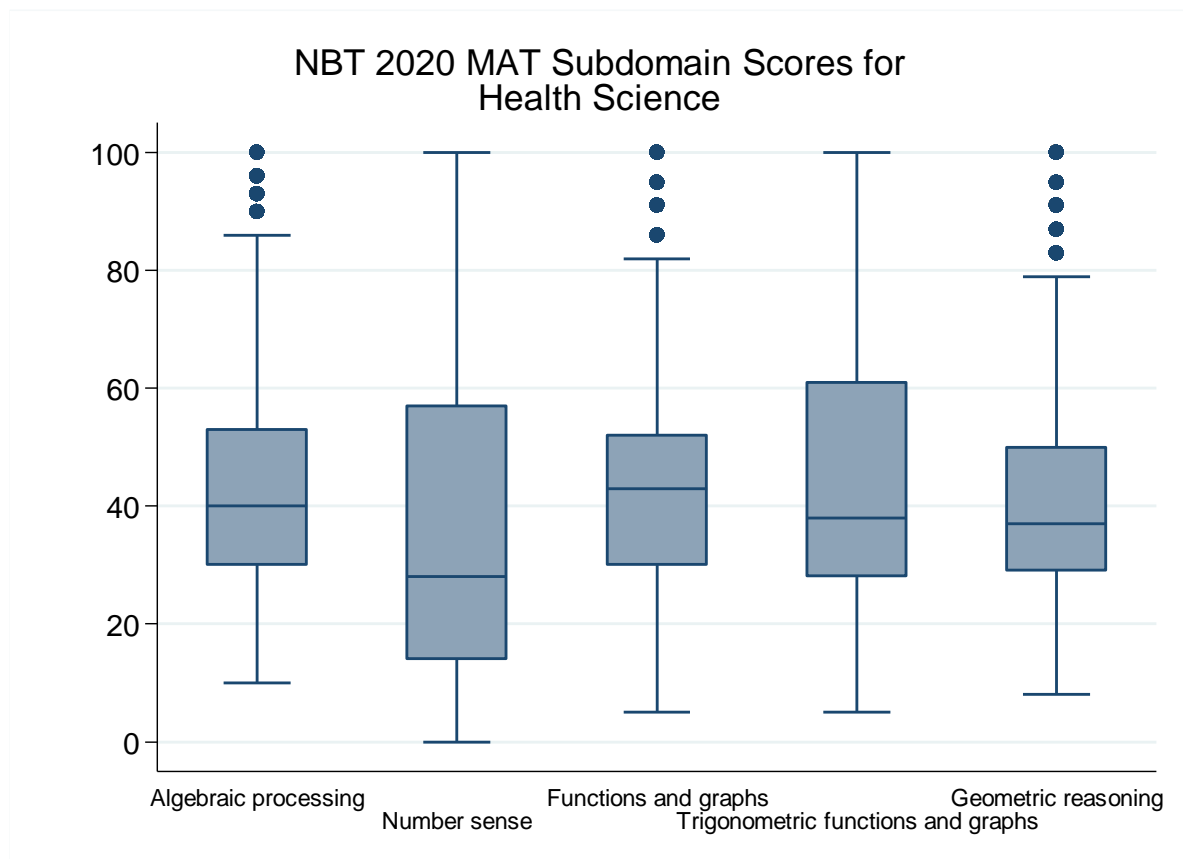


Figure 44 Health Science MAT subdomain performance, NBT 2020

It is possible that candidates intending to study in the area of Hospitality and Tourism did not take Mathematics at school, and may have taken Mathematical Literacy, which would not have equipped them to write the MAT test. It is difficult to interpret the scores below; however it is unlikely that these candidates will study mathematics related courses. The boxplots below show that in all subdomains the medians are below 35% and in the Basic band, except in the Trigonometric functions and graphs, where the median is slightly above 35%, indicative of substantial support requirements should they enrol for courses that require these skills.

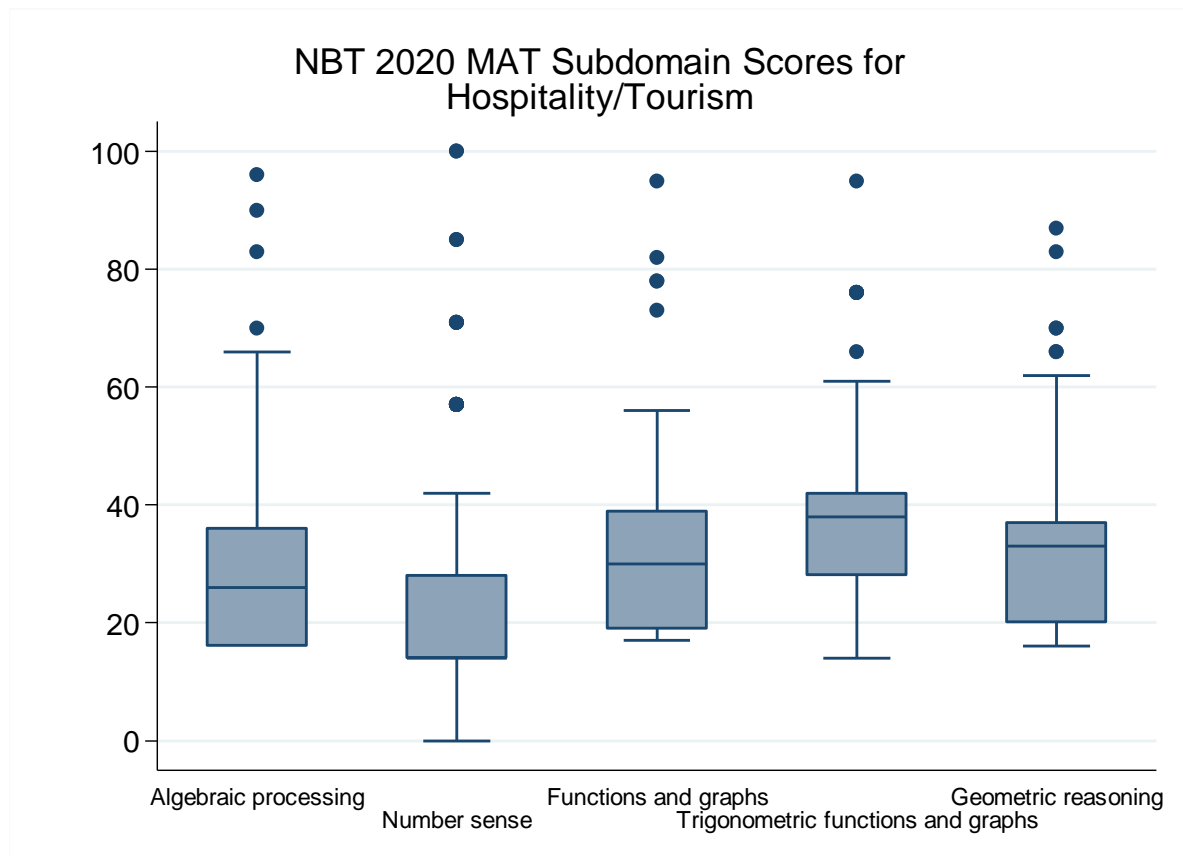


Figure 45 Hospitality/Tourism MAT subdomain performance, NBT 2020

Mathematics is not in general a requirement for Humanities. Since the majority of the candidates whose scores are reflected in the boxplots below are unlikely to be studying mathematics courses, it is difficult to interpret these scores. The boxplots below show that in all subdomains the medians are below 37% and mostly fall in the Basic band, indicative of substantial support requirements should they enrol for courses that require these skills.

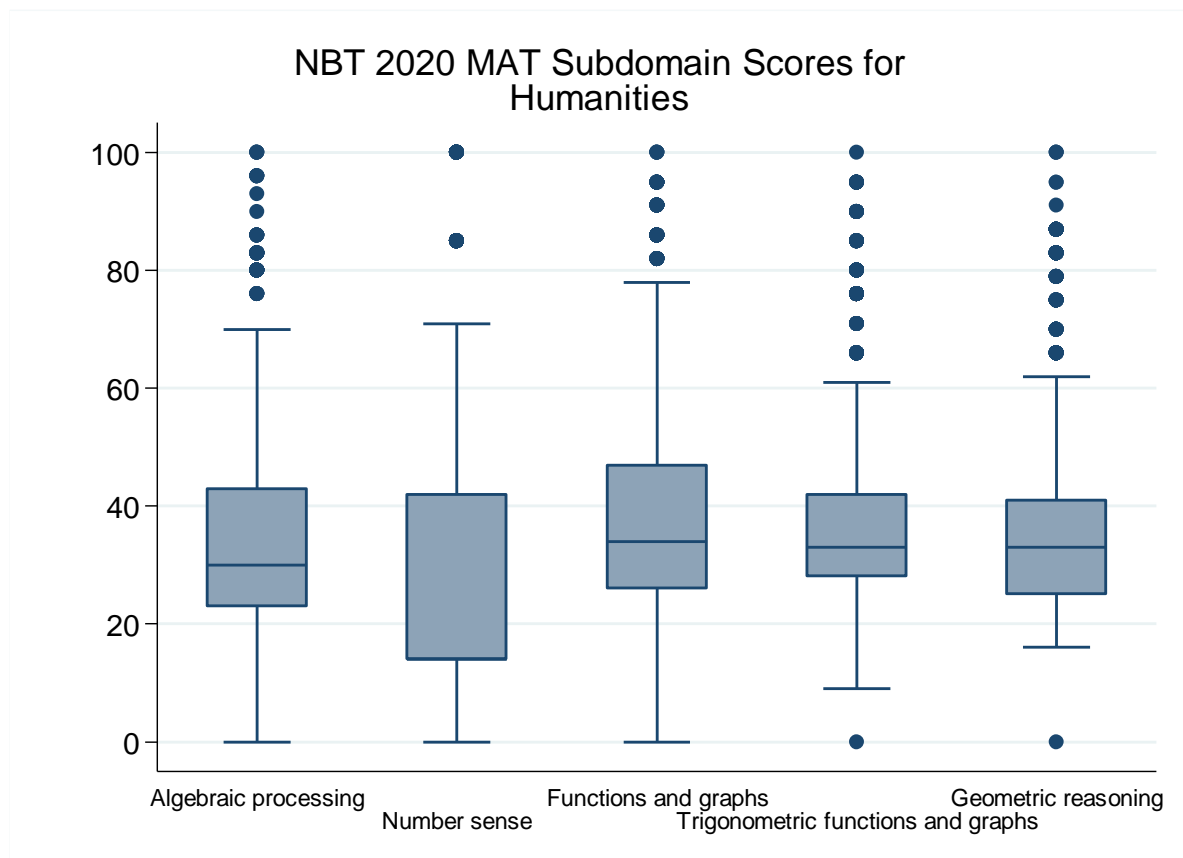


Figure 46 Humanities MAT subdomain performance, NBT 2020

In many institutions, Mathematics is a requirement for degrees in Information and Communication Technology. The high-scoring outliers in this group are unlikely to need support in mathematics. The median scores in all subdomains reflected in the boxplots below are 40% or lower and thus fall in the Basic or Intermediate Lower bands. The low scores are indicative of the extensive mathematical support that will be needed by the candidates in this group in all subdomains, except possibly Geometric reasoning. The components of this subdomain (analytic geometry, angles and shape, area and volume, circle geometry) may not be important for ICT courses.

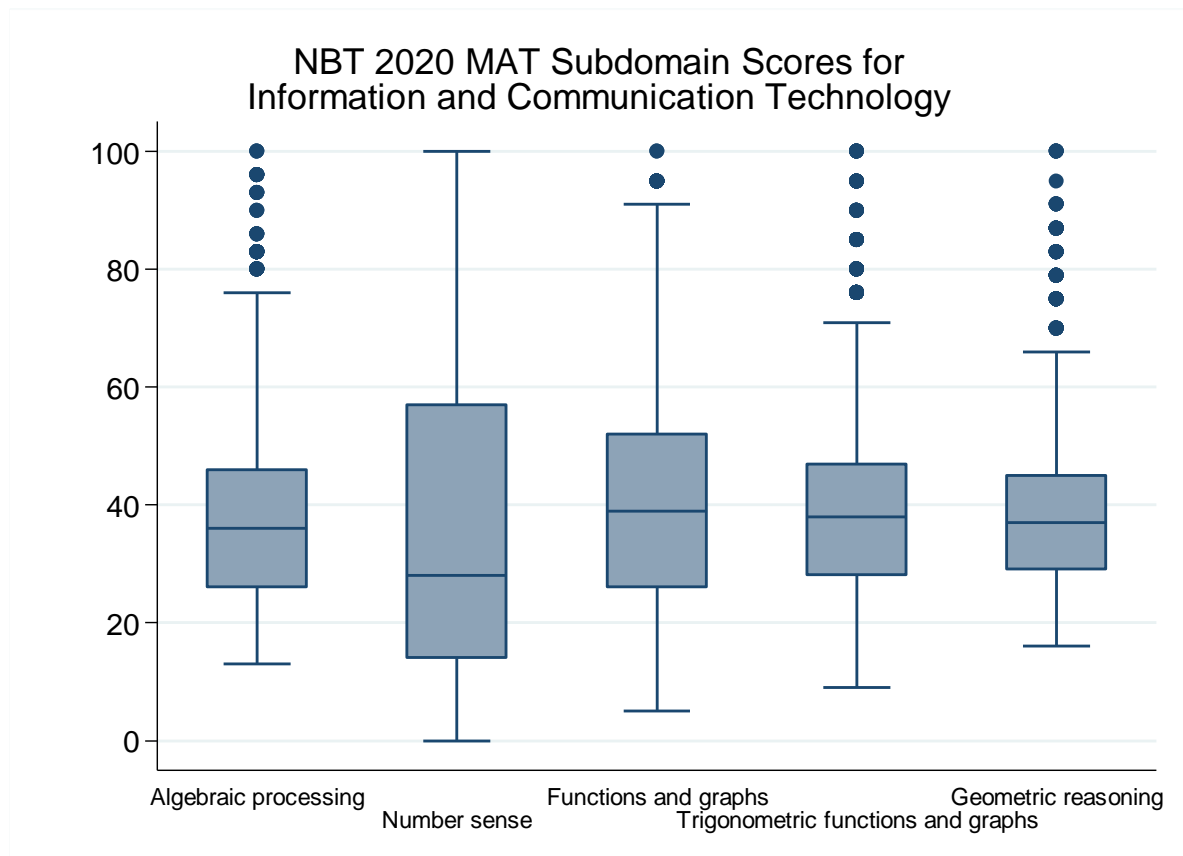


Figure 47 Information and Communication Technology MAT subdomain performance, NBT 2020

Mathematics is generally not a requirement for Law. Since the majority of the candidates whose scores are reflected in the boxplots below are likely to enrol for Law, and are unlikely to be studying mathematics courses, it is not necessary to comment further on these scores, apart from raising one specific concern: students in the Law faculty will need support (even if it is provided via QL support courses) in the MAT subdomain Number sense if they are to be able to make logical decisions with regard to number relationships, orders of magnitude, etc. The boxplots below show that in all subdomains the medians are below 35% and fall in the Basic or Lower Intermediate bands, indicative of substantial support requirements should they enrol for courses that require these skills.

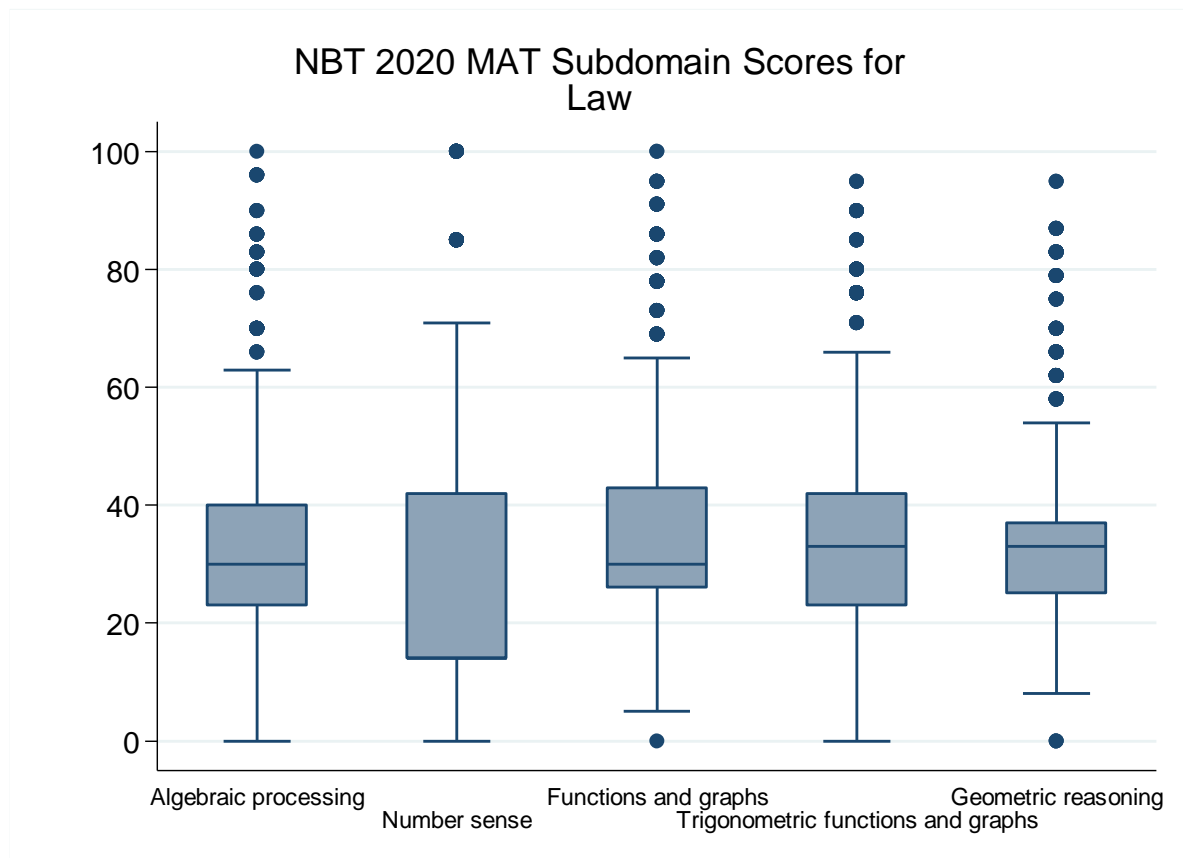


Figure 48 Law MAT subdomain performance, NBT 2020

Mathematics is a core course for Science and Mathematics courses. It is a matter of concern that for candidates intending to register for Science and Mathematics courses, the medians in all subdomains are all around 50% and below and therefore either in or close to the Lower Intermediate band (scores below 35%). Clearly there are some high-performing candidates, but on the whole extensive mathematical support will need to be provided for those who enrol in these courses. Performance in Number sense and Geometric reasoning (medians are 44% and 48%) is particularly low, and this will have to be addressed if candidates are to cope with their mathematical studies. We point out again that low performance in the latter subdomain may be attributed to the change in curriculum and a possible lag in teaching expertise.

These results are illustrated in Figure 66 below.

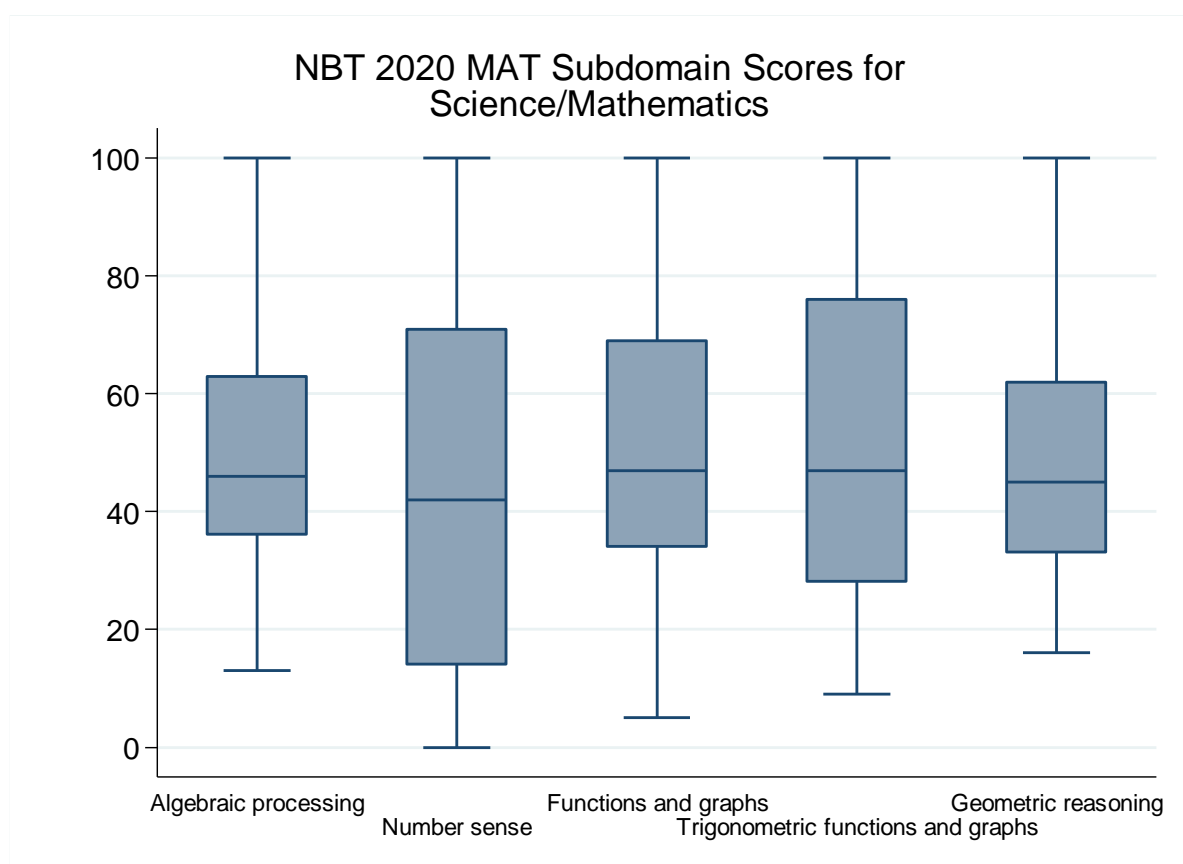


Figure 49 Science/Mathematics MAT subdomain performance, NBT 2020

Since we cannot be certain in which fields these students will eventually enrol, it is difficult to interpret these scores. The boxplots below show that in all subdomains the medians are below 40% and fall in the Lower Intermediate band, indicative of substantial support requirements should they enrol for courses that require these skills.

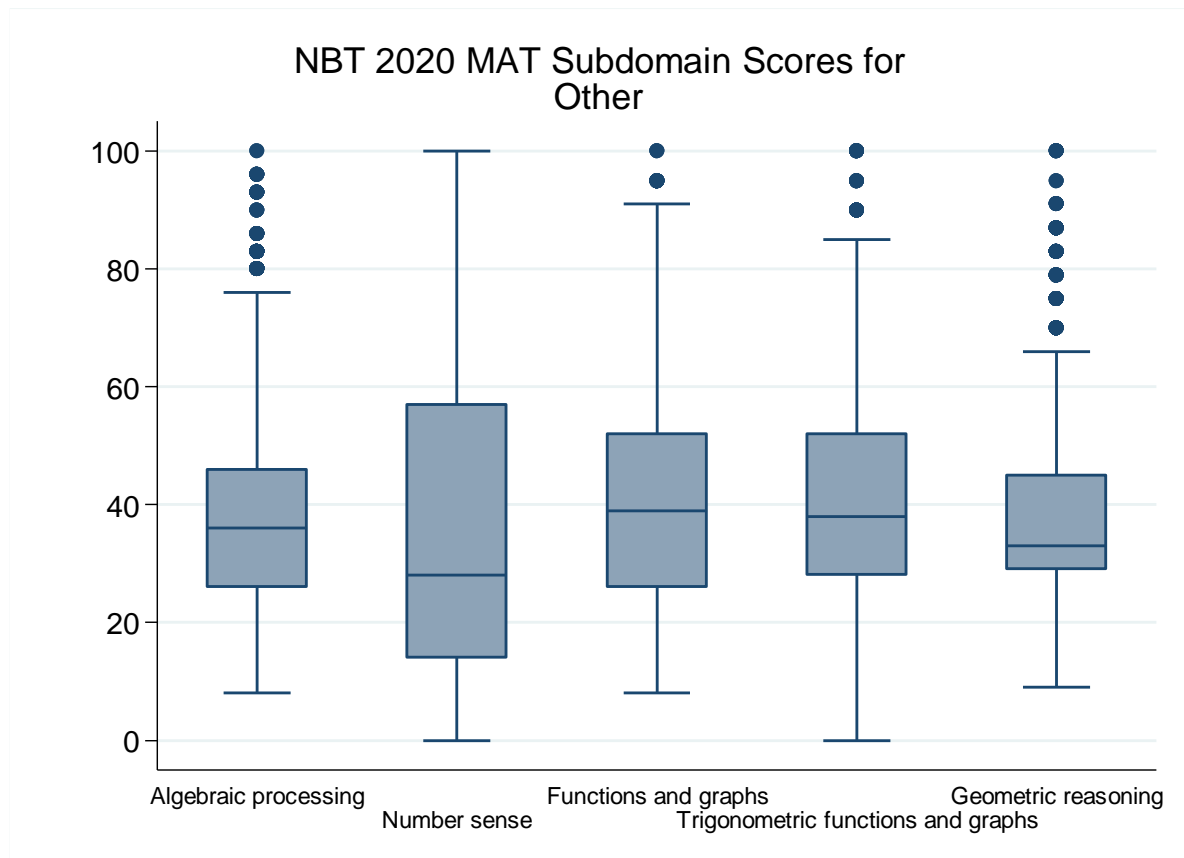


Figure 50 Other MAT subdomain performance, NBT 2020

6. PERFORMANCE ON THE 2020 NBTP HIGHER EDUCATION INTAKE CYCLE TESTING AND PERFORMANCE IN COGNATE NSC SUBJECTS IN 2019

This report now turns to the presentation and discussion of associations between the National Senior Certificate examination and the NBTs. This is done principally to examine the extent to which the NBTs might be said to provide complementary information to that provided by the NSC about the school-leaving cohort wishing to enter higher education.

The National Senior Certificate (NSC) is structured according to specific categories of subjects and rules of combination.

For a learner/candidate to obtain a National Senior Certificate, the learner must offer seven approved subjects and provide full evidence of School Based Assessment for each subject and he/she must:

- (a) Complete the programme requirements for Grades 10, 11 and 12 separately and obtain the distinct outcomes and associated assessment standards of all three years;
- (b) Comply with the internal assessment requirements for Grades 10, 11 and 12 and the external assessment requirements of Grade 12; and

The minimum requirements to obtain a National Senior Certificate are:

- (a) Achievement of 40% in three subjects, one of which is an official language at Home Language Level;
- (b) Achievement of 30% in three subjects; and
- (c) Full evidence in the school-based assessment component in the subject field.

Table 16 Scale of achievement/level descriptors

Achievement Level	Achievement Description	Marks %
7	Outstanding achievement	80 – 100
6	Meritorious achievement	70 – 79
5	Substantial achievement	60 – 69
4	Adequate achievement	50 – 59
3	Moderate achievement	40 – 49
2	Elementary achievement	30 – 39
1	Not achieved	0 – 29

6.1 MINIMUM REQUIREMENTS FOR ADMISSION TO THE HIGHER CERTIFICATE, DIPLOMA AND BACHELOR'S DEGREE

Minimum Higher Education Admission requirements in accordance with the three levels of undergraduate programmes are as follows:

(a) Higher Certificate

The minimum admission requirement is a National Senior Certificate with a minimum of 30% in the language of learning and teaching of the Higher Education Institution as certified by Umalusi, the Quality Assurance Council. Institutional and programme needs may require additional combinations of recognised NSC subjects and levels of achievement.

(b) Diploma

The minimum admission requirement is a National Senior Certificate with a minimum of 30% in the language of learning and teaching of the Higher Education Institution as certified by Umalusi, the Quality Assurance Council, coupled with an achievement rating of 3 (Moderate Achievement, 40% – 49%) or better in four recognised NSC 20-credit subjects. Institutional and programme needs may require additional combinations of recognised NSC subjects and levels of achievement.

(c) Bachelor's Degree

The minimum admission requirement is a National Senior Certificate with a minimum of 30% in the language of learning and teaching of the Higher Education Institution as certified by Umalusi, the Quality Assurance Body, coupled with an achievement rating of 4 (Adequate achievement, 50% – 59%) or better in four subjects chosen from the 20 credit-bearing NSC subjects. Some of these are:

Table 17 The Higher Education Designated Subject List

Accounting	Information Technology
Agricultural Science	Languages
Business Studies	Life Sciences
Consumer Studies	Mathematics
Dramatic Arts	Mathematical Literacy
Economics	Music
Engineering Graphics and Design	Physical Sciences
Geography	Religion Studies
History	Visual Arts

6.2 NOTES ON THE SAMPLE USED FOR THE ANALYSIS IN THIS SECTION

Since it is not clear which result to keep if a candidate wrote the NBT multiple times, the scores of all candidates who wrote the NBT more than once were excluded from this subsample. Calculation of a correlation coefficient is based on the assumption that the data satisfy the assumption of independence of observations, i.e., observations are not influenced by each other. Repeat occurrences of one individual would be an example of observations that influence each other. NSC results were then matched. The resulting subsample came to 56,906 candidates. Nearly 83.27% (47,385) of these candidates achieved the NSC with a Bachelor's pass while the remaining 9,521 (16.73%) achieved the NSC with a Diploma or Higher Certificate pass.

Please note, list wise deletion was utilised when correlation coefficients were calculated and scatterplots were constructed. List wise deletion means that candidates were excluded from analysis if any single value for a particular calculation was missing. The sample was further analysed separately by Higher Education (HE) Admission type (Degree; Diploma/Higher Certificate).

NSC Subject codes:

MTHN = Mathematics

MTLN = Mathematical Literacy

ENHN = English Home Language

ENFN = English First Additional Language

PSCN = Physical Sciences

Caution should be used when interpreting the correlation coefficients. The scatterplots for the NSC ENFN against NBT AL, NSC MTHN against NBT QL, NSC MTLN against NBT QL, NSC MTHN against NBT MAT, NSC PSCN against NBT MAT show heterogenous variance. The point cloud of the scatterplot for NSC MTLN against NBT QL also show some non-linear trend.

6.3 SELF-REPORTED DEMOGRAPHICS

The 2020 Intake cycle NBT – 2019 NSC cohort self-classified their biographical details. The cohort consisted of approximately 63% female and 37% male; approximately 64% were black and 17% white; approximately all were South African citizens and approximately 29% reported English as their home language while the vast majority had an African language as home language. 83% of the cohort achieved the NSC at a Bachelor's degree level and the remainder at Higher Certificate or Diploma level.

Table 18 Self-reported demographics

	Full Sample		Bachelor's		Diploma or Higher Certificate	
	N	%	n	%	n	%
GENDER						
Male	21,330	37.48	18,220	38.45	3,110	32.66
Female	35,573	62.51	29,163	61.54	6,410	67.32
Other	3	0.0100	2	0	1	0.0100
Total	56,906	100	47,385	100	9,521	100
POPULATION GROUP						
Black	36,503	64.15	28,600	60.36	7,903	83.01
Coloured	6,899	12.12	5,699	12.03	1,200	12.60
Indian/Asian	3,594	6.320	3,374	7.120	220	2.310
White	9,725	17.09	9,546	20.15	179	1.880
Other	185	0.330	166	0.350	19	0.200
Total	56,906	100	47,385	100	9,521	100
CITIZENSHIP						
South African	56,700	99.64	47,194	99.60	9,506	99.84
SADC country	36	0.0600	33	0.0700	3	0.0300
Other African country	82	0.140	74	0.160	8	0.0800
Other	88	0.150	84	0.180	4	0.0400
Total	56,906	100	47,385	100	9,521	100
HOME LANGUAGE						
Afrikaans	5,932	10.42	5,434	11.47	498	5.230
English	16,663	29.28	15,053	31.77	1,610	16.91
isiNdebele	483	0.850	360	0.760	123	1.290
isiXhosa	8,816	15.49	6,571	13.87	2,245	23.58
isiZulu	7,146	12.56	6,070	12.81	1,076	11.30
Sesotho	4,096	7.200	3,057	6.450	1,039	10.91
Sesotho sa Leboa	4,021	7.070	3,124	6.590	897	9.420
Setswana	3,137	5.510	2,556	5.390	581	6.100
siSwati	1,227	2.160	1,015	2.140	212	2.230
Tshivenda	2,357	4.140	1,819	3.840	538	5.650
Xitsonga	2,465	4.330	1,858	3.920	607	6.380
Other Language	563	0.990	468	0.990	95	1
Total	56,906	100	47,385	100	9,521	100
GR12 LANGUAGE						
Afrikaans	5,616	9.870	5,104	10.77	512	5.380
English	49,718	87.37	41,131	86.80	8,587	90.19
Other	1,572	2.760	1,150	2.430	422	4.430
Total	56,906	100	47,385	100	9,521	100
HE ADMISSION						
Bachelor's degree	47,385	83.27				
Diploma/Higher Certificate	9,521	16.73				
Total	56,906	100				

6.4 DESCRIPTIVE STATISTICS

Table 19 Descriptive statistics

	N	mean	Sd	min	p25	p50	p75	Max
TOTAL COHORT								
NBT AL	56,877	55.19	14.68	16	43	54	67	96
NBT QL	56,903	46.42	15.89	8	34	42	56	99
NBT MAT	44,587	41.64	17.48	2	28	35	51	98
NSC MTHN	46,307	55.93	18.38	3	42	56	69	100
NSC MTLN	10,660	63.62	15.17	17	52	64	75	100
NSC ENHN	29,600	67.58	10.79	35	60	68	75	97
NSC ENFN	27,306	68.46	10.04	31	62	69	76	98
NSC PSCN	38,025	61.93	17.19	13	49	62	75	100
BACHELOR'S DEGREE								
NBT AL	47,356	57.57	14.28	16	46	57	69	96
NBT QL	47,382	48.76	16.07	8	36	45	59	99
NBT MAT	38,025	43.94	17.85	6	29	38	55	98
NSC MTHN	39,429	59.79	16.70	4	48	60	72	100
NSC MTLN	8,072	68.24	13.12	17	59	69	78	100
NSC ENHN	25,389	69.79	9.540	38	63	70	77	97
NSC ENFN	21,996	70.70	9.050	34	64	71	77	98
NSC PSCN	32,470	65.88	15.08	13	55	66	77	100
DIPLOMA/CERTIFICATE								
NBT AL	9,521	43.32	10.17	24	36	41	49	86
NBT QL	9,521	34.74	7.740	15	30	33	37	84
NBT MAT	6,562	28.28	4.580	2	25	27	30	75
NSC MTHN	6,878	33.79	10.01	3	27	34	41	79
NSC MTLN	2,588	49.19	11.70	19	41	48	57	92
NSC ENHN	4,211	54.31	8	35	48	54	60	82
NSC ENFN	5,310	59.21	8.500	31	53	60	65	87
NSC PSCN	5,555	38.79	8.100	13	33	39	44	74

Figure 68 below highlights the differences in the purposes of the NSC and NBT. In measuring school exit levels, MTHN, MTLN and PSCN scores are markedly higher than NBT MAT and QL scores; ENHN and ENFN scores are markedly higher than NBT AL scores. Half the MTLN candidates score above 64%. This is in no way reflected in the QL scores, where the median is 42%.

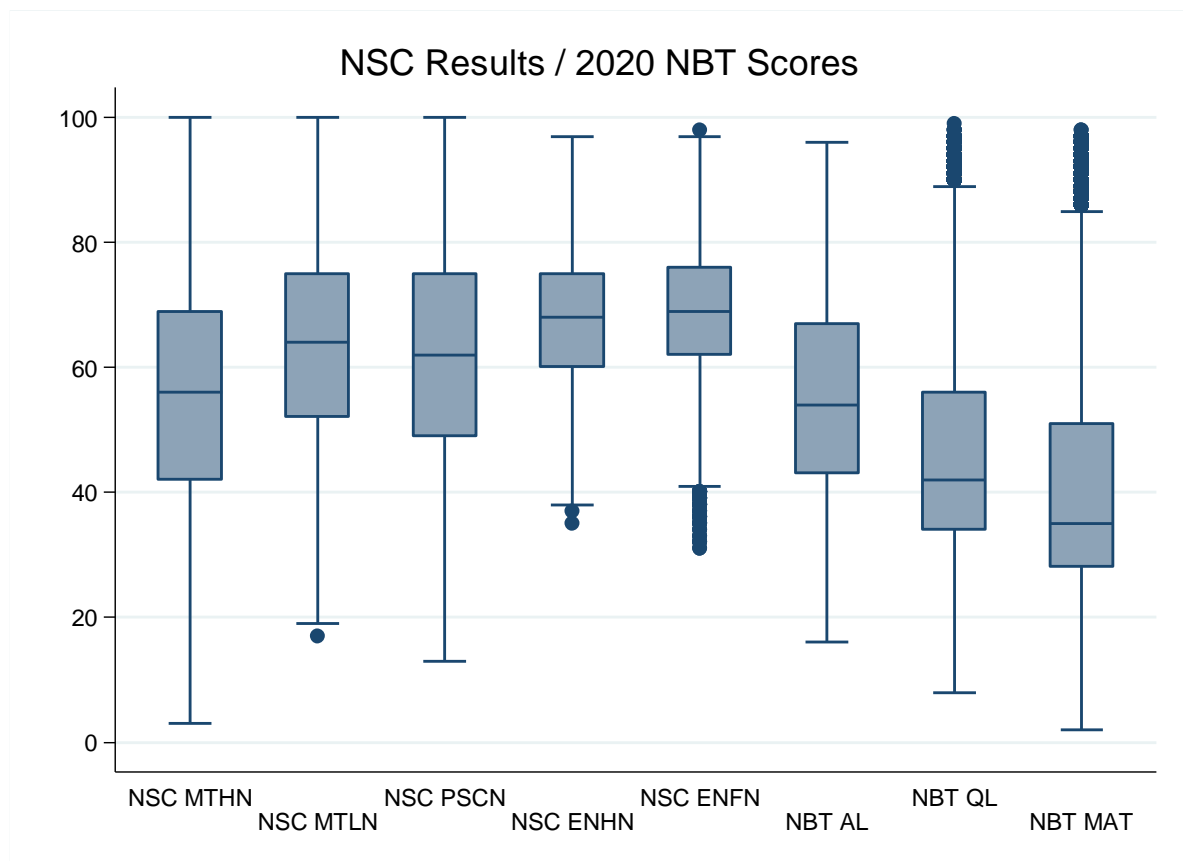


Figure 51 2019 NSC/2020 NBT scores

NSC Results/ 2020 NBT Scores

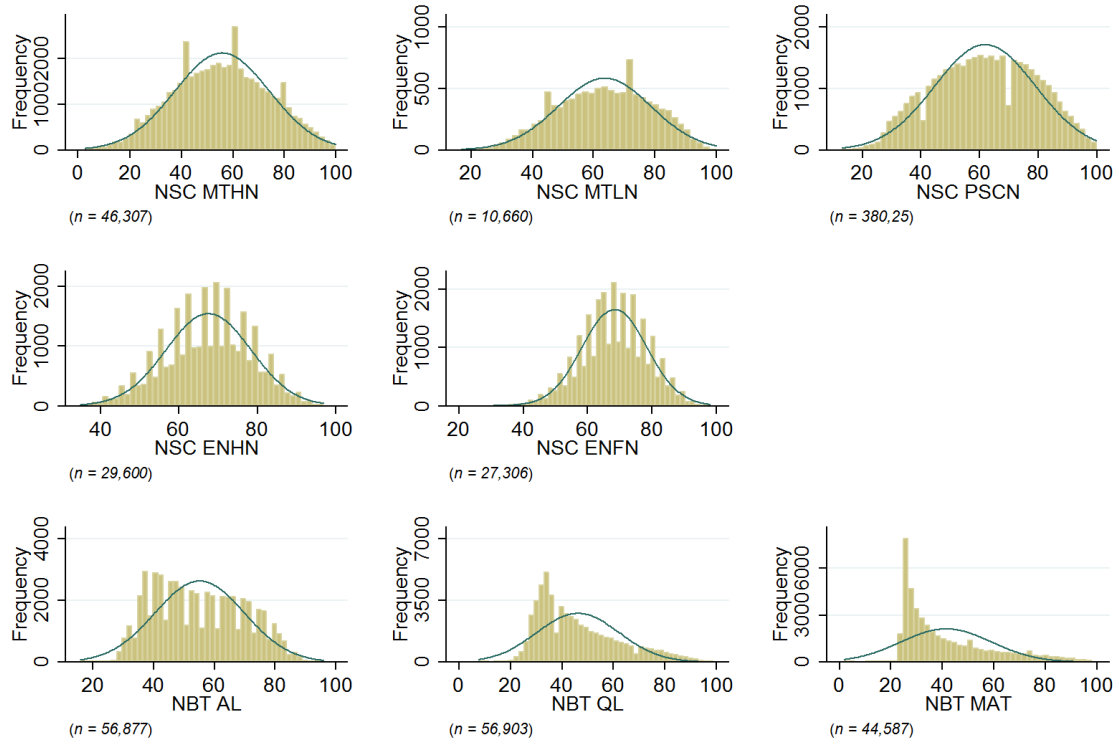


Figure 52 2019 NSC / 2020 NBT scores

7. COMPARISON

7.1 COMPARISON: PERFORMANCE LEVELS BY INTENDED FACULTIES OF STUDY, TESTS WRITTEN IN ENGLISH AND AFRIKAANS

This section reports the comparison between candidates by intended faculty of study separately for English and Afrikaans writers.

7.1.1 AL PERFORMANCE BY INTENDED FACULTY OF STUDY, TESTS WRITTEN IN ENGLISH AND AFRIKAANS

In general, the proportion of candidates who scored in the Proficient band on the NBT AL in Afrikaans was larger than that of their English counterparts when comparing the scores according to intended faculty, with the exception for that of Education. It is also clear from the statistics presented in figures 14 and 15 that the proportion of students in the Basic band across all of the faculties is higher for the English cohorts in comparison with the students who wrote the papers in Afrikaans for the same faculties. The faculty group with the highest proportion of candidates in the Basic band was Hospitality/Tourism for both the cohorts – 14 % for the cohort that wrote in Afrikaans and 36% for those that wrote in English.

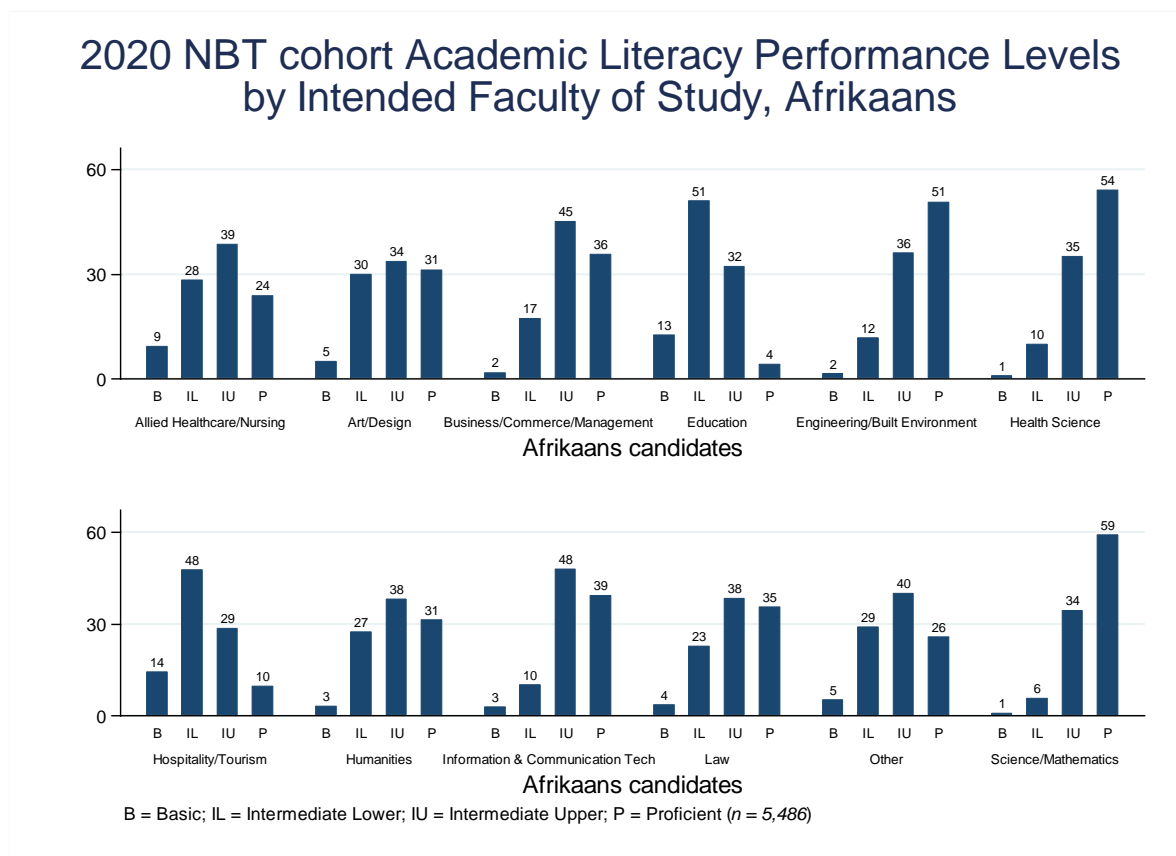


Figure 53 2020 NBT AL Performance Levels by intended programme of study for Afrikaans writers

2020 NBT cohort Academic Literacy Performance Levels by Intended Faculty of Study, English

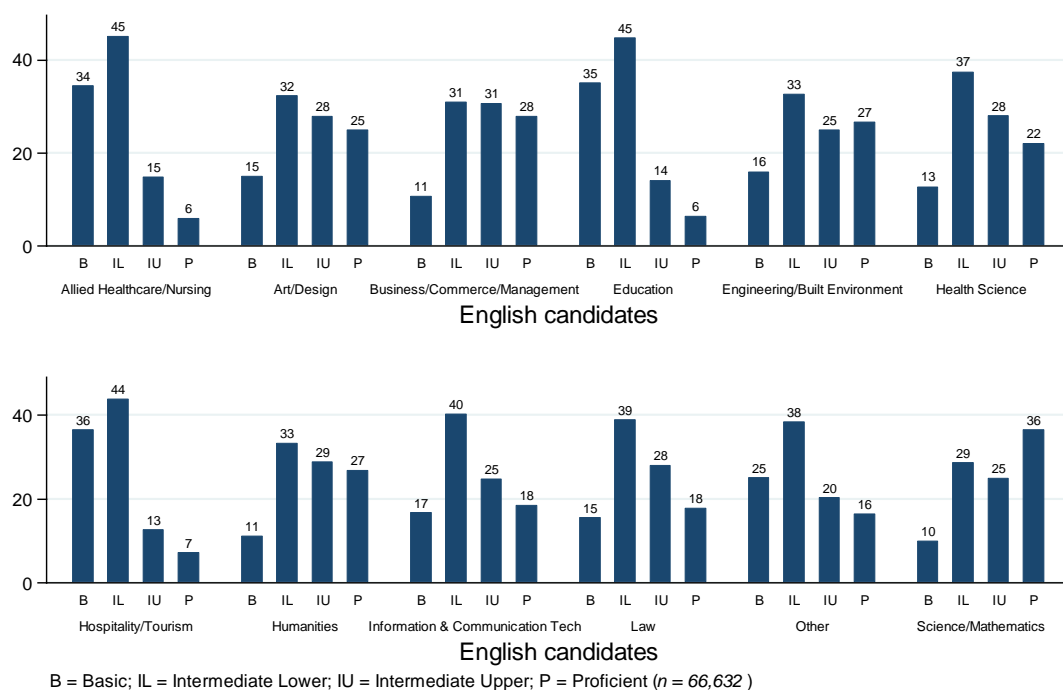


Figure 54 2020 NBT AL performance levels by intended programme of study for English writers

7.1.2 QL PERFORMANCE BY INTENDED FACULTY OF STUDY, TESTS WRITTEN IN ENGLISH AND AFRIKAANS

The QL performance of candidates who wrote in Afrikaans was generally higher than that of the candidates who wrote in English. Overall the proportions of candidates who wrote in Afrikaans and had scores in the Proficient band were higher than their English counterparts. The proportions of candidates who wrote in Afrikaans whose scores fell in the Basic band in QL were also lower compared to the proportions of candidates who wrote in English. A high proportion of candidates who wrote in English are classified Basic and the candidates applying to the Hospitality/Tourism (81%), Education (79%), and Allied Healthcare/Nursing (74%) and faculties showed the largest proportions of candidates in the Basic performance band. In terms of those who wrote in Afrikaans, the candidates applying for Education (71%) and Hospitality/Tourism (67%) showed the largest proportions of candidates in the Basic performance band.

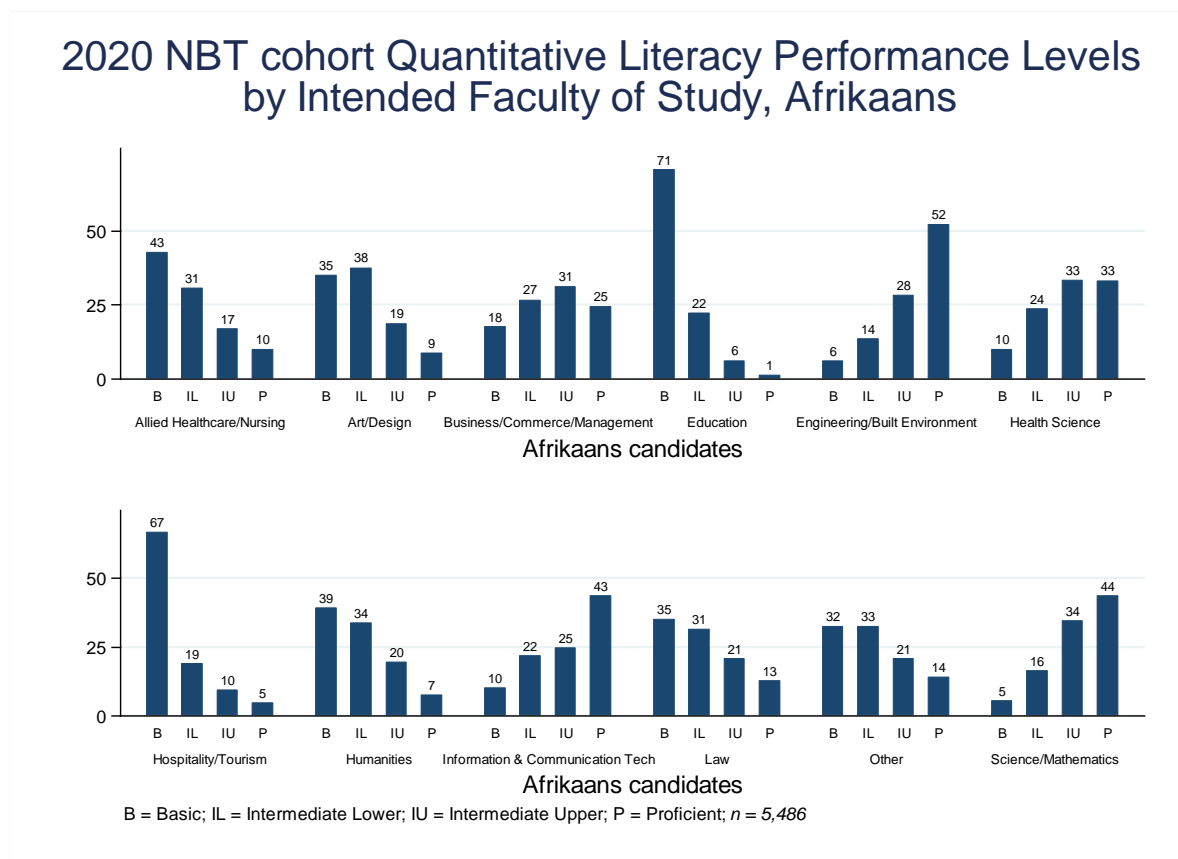
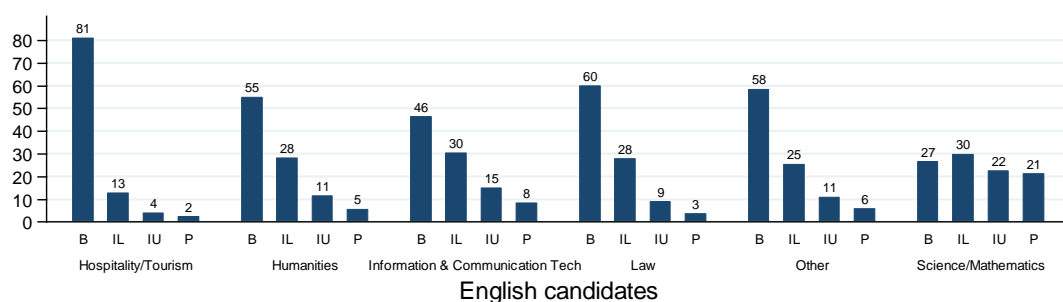
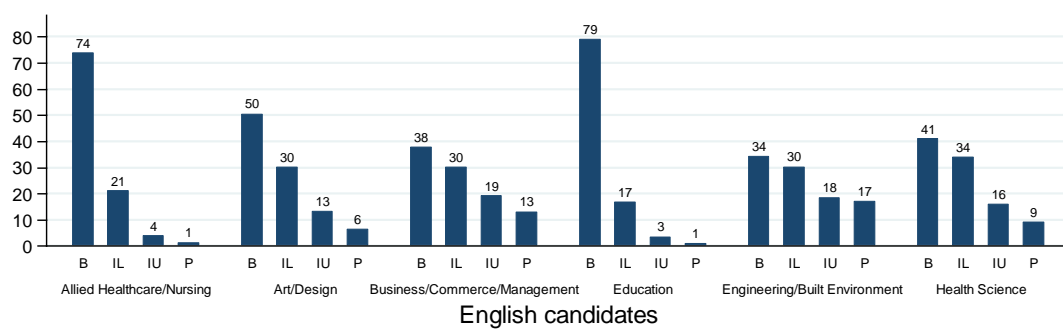


Figure 55 2020 NBT QL performance levels by intended faculty of study for Afrikaans writers

2020 NBT cohort Quantitative Literacy Performance Levels by intended faculty of study, English



B = Basic; IL = Intermediate Lower; IU = Intermediate Upper; P = Proficient; $n = 66,673$

Figure 56 2020 NBT QL performance levels by intended faculty of study for English writers

7.1.3 MAT PERFORMANCE BY INTENDED FACULTY OF STUDY, TESTS WRITTEN IN ENGLISH AND AFRIKAANS

MAT performance of candidates who wrote in Afrikaans was generally higher than that of candidates who wrote in English. The proportion of candidates who wrote in Afrikaans and had scores in the Proficient band were higher than their English counterparts in the same faculties, such as in Engineering/Built Environment (35% of the Afrikaans compared to 14% of the English group), Health Science (30% of the Afrikaans group, 9% of the English cohort) and Science/Mathematics (29% of the Afrikaans group, 18% of the English cohort). Also noticeable are the differences in the proportion of candidates that scored in the Basic category. Across all of the faculty groups, the proportions of candidates who wrote in English and scored in the Basic performance band were higher than their counterparts who wrote the Afrikaans papers.

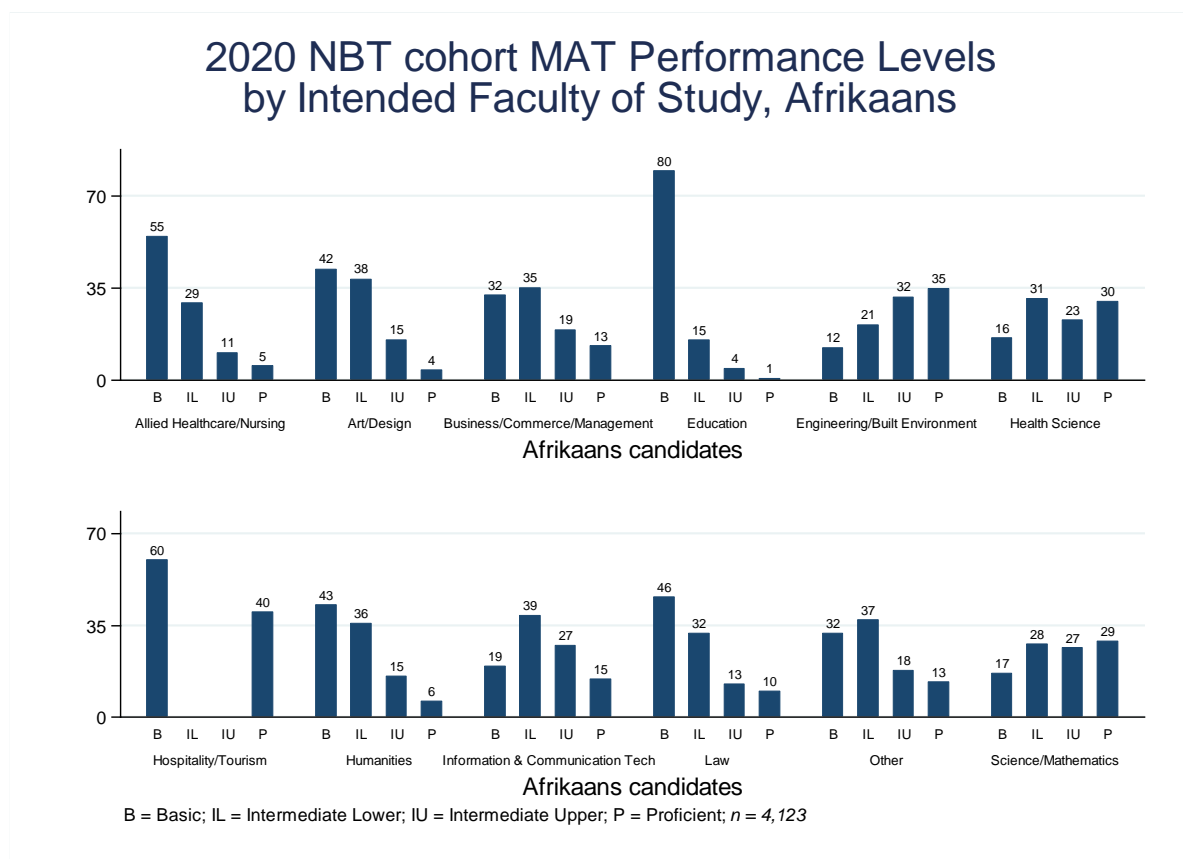
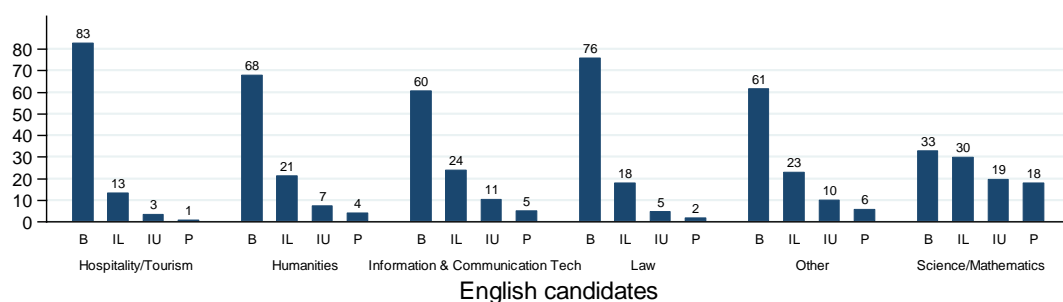
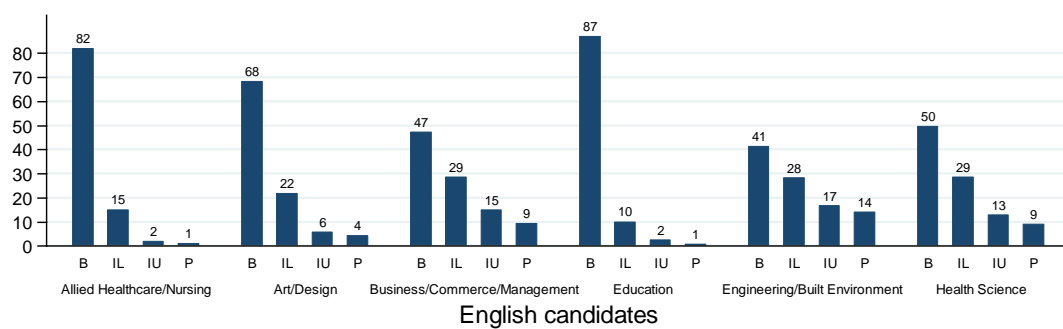


Figure 57 2020 NBT MAT performance levels by intended programme of study

2020 NBT Cohort MAT Performance Levels By Intended Faculty of Study, English



B = Basic; IL = Intermediate Lower; IU = Intermediate Upper; P = Proficient; $n = 51,108$

Figure 58 2020 NBT MAT performance levels by intended programme of study for English writers

7.2 COMPARISON OF THE 2020 INTAKE RESULTS TO THE 2019 INTAKE RESULTS

In this section we examine the performance in AL, QL and MAT of the candidates in the 2019 and 2020 intake cycles to investigate broad trends of the NBT over time. In broad terms, the 2020 intake cohort performed fairly similarly to the 2019 intake cohort in terms of all three domain (AL, QL and MAT) proficiency categories.

7.2.1 NATIONAL COHORT

Figure 23 shows that there was a slight improvement in performance on AL from the 2019 intake cohort to the 2020 intake cohort. The proportion of scores in the Proficient category for this domain decreased slightly from 23.5% of the cohort to 23.36%, while the proportion of the scores in the Basic category creased slightly from 13.94% to 15.32%.

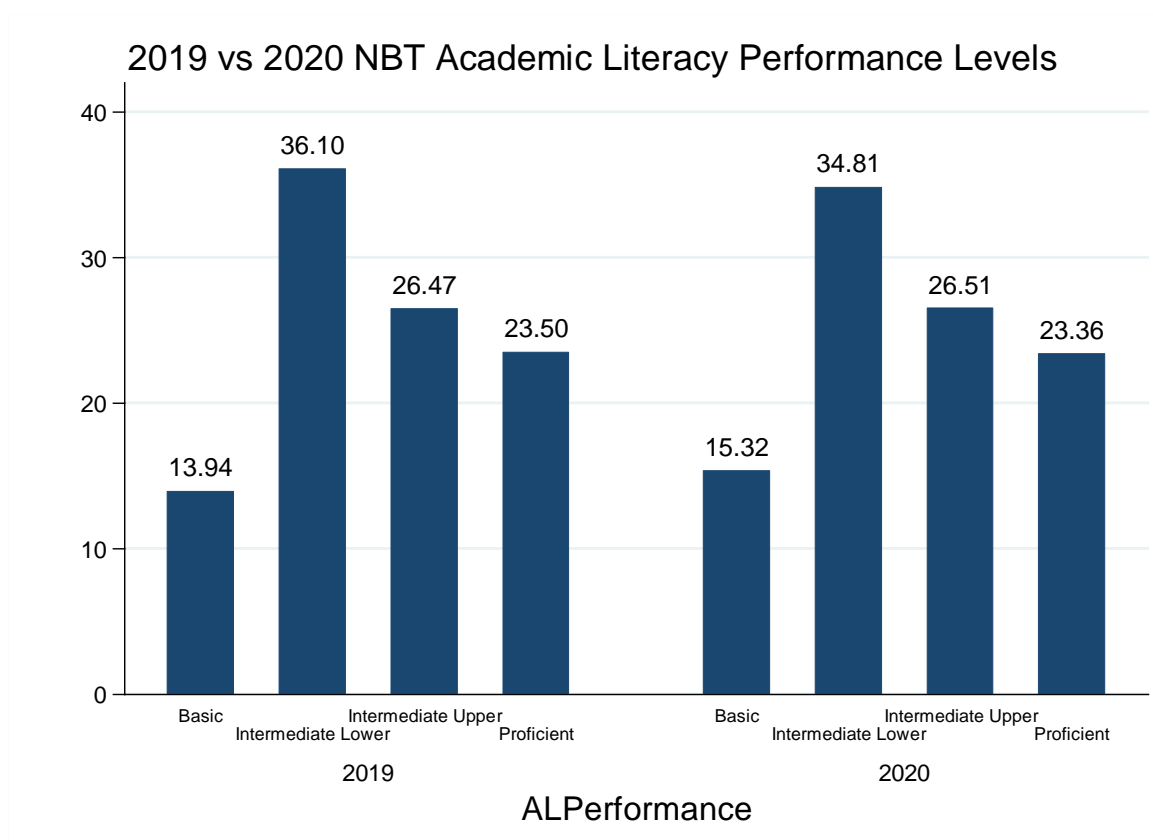


Figure 59 Performance in AL, 2019 and 2020 intake cycles

Overall, the QL performance has stayed the same over the last few years with marginal shifts in the four performance categories. The proportions of candidates whose QL scores were in the Basic band increased from 44.30% in the 2019 intake to 45.48% in 2020 intake. There have also been slight changes in the proportions in the Intermediate performance bands: an increase from 15.70% to 15.14% for the Intermediate Upper band and an increase from 27.57% to 28.75% for the Intermediate Lower band. There was a slight increase in the proportions of candidates with scores in the Basic band in QL between the 2019 intake and the 2020 intake, namely 44.30% in the former and 45.48% in the latter. These slight

differences may indicate that candidates wishing to enter higher education have comparable levels of preparedness for the demands of academic study from one year to the next.

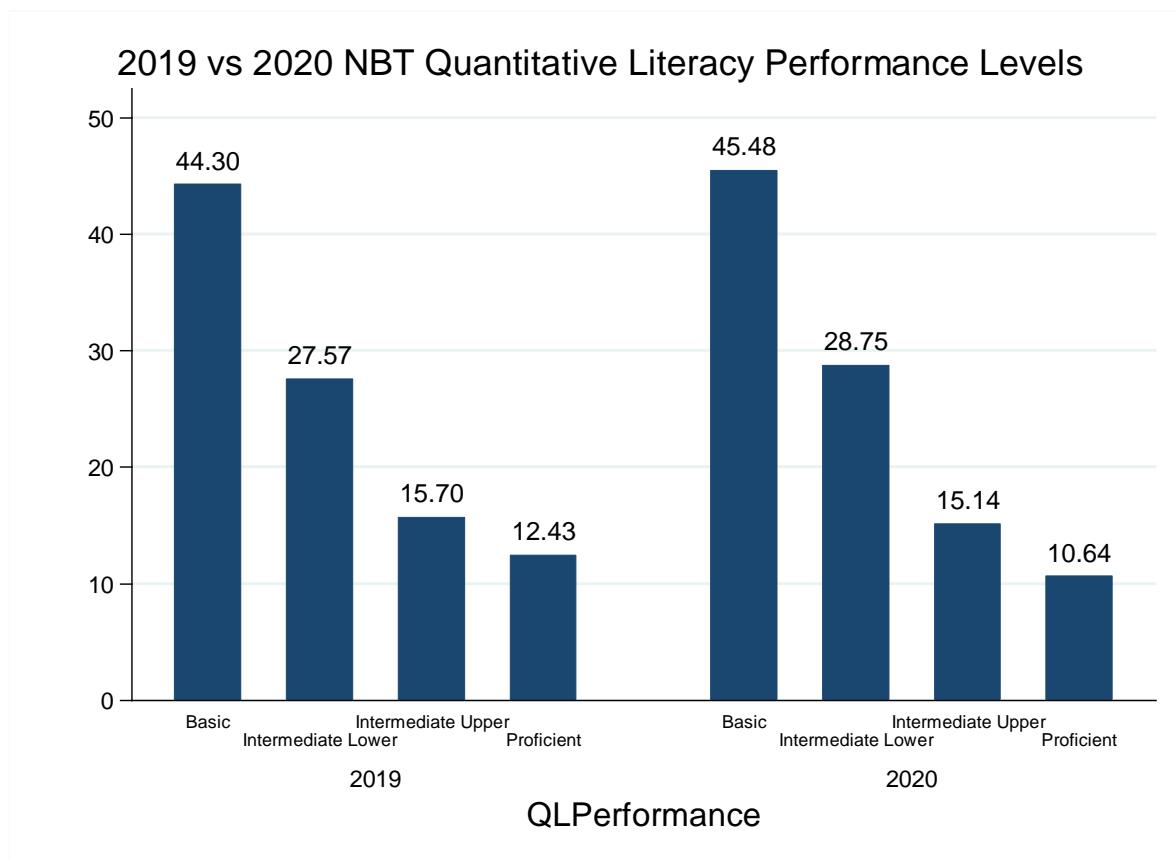


Figure 60 Performance in QL, 2019 and 2020 intake cycles

Performance in MAT has increased slightly at the Proficient level, from 9.65% in the 2019 intake to 9.94% in the 2020 intake. The proportions of scores in the Basic category have decreased slightly from 52.10% to 50.96% over the same period. The proportions in the two Intermediate categories (Lower and Upper considered together) increased slightly, from 38.25% in the 2019 intake to 39.10% in the 2020 intake.

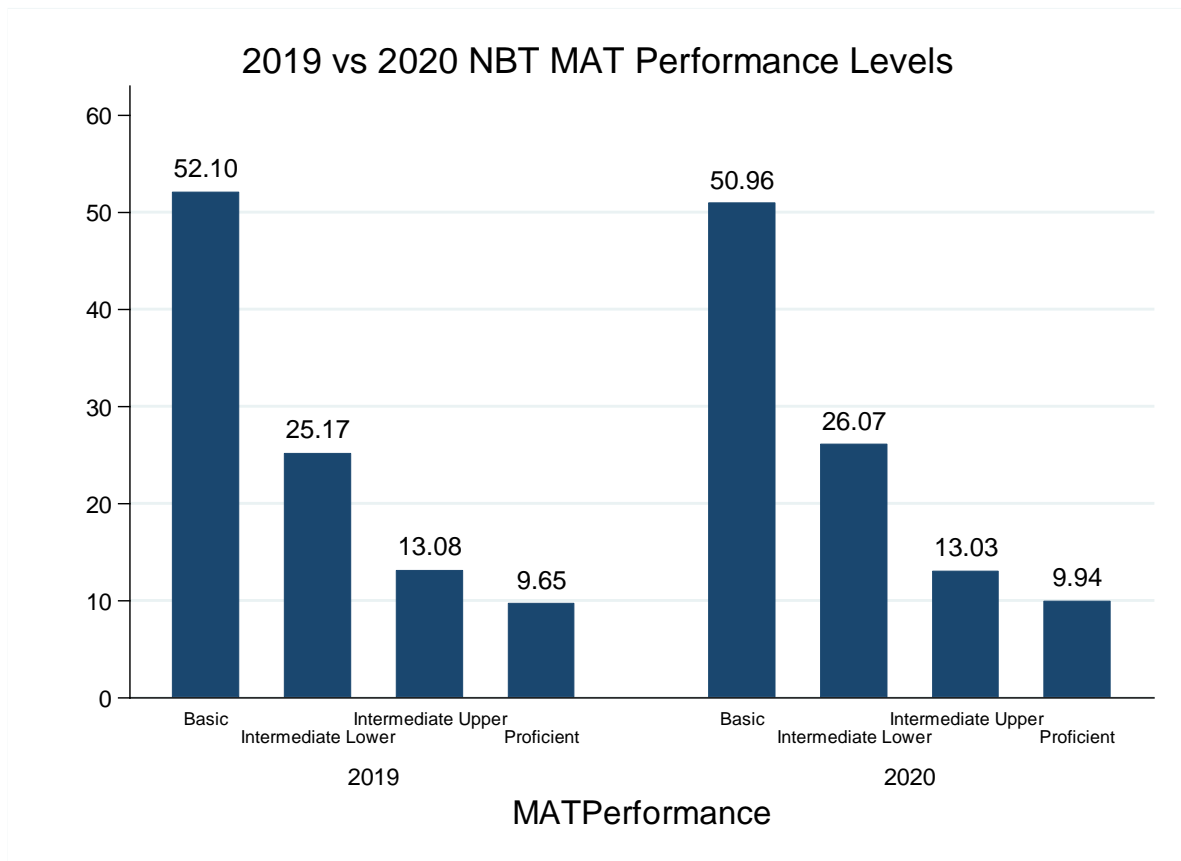


Figure 61 Performance in MAT, 2019 and 2020 intake cycles

7.2.2 TEST LANGUAGE

Figure 26 below contains statistical data comparing the performance of candidates who wrote the AL test in Afrikaans and candidates who wrote the AL test in English respectively.

It is clear from this graph that for this cohort, there were larger proportion of English (16.3%) than Afrikaans (3.5%) candidates with scores in the Basic category. The Afrikaans group constituted a lower proportion in the Intermediate Lower category (19.9%) than their English counterparts (36%); the Afrikaans candidates constituted a higher proportion of those in the Intermediate Upper band (39.2%) than their English counterparts (25.6%). Also, the English candidates constituted a lower proportion in the Proficient band (22.1%) than the Afrikaans group (39.2%).

What is evident from these comparisons is that Afrikaans NBT AL candidates tended to perform better than their English counterparts in both the 2019 intake cycle and 2020 intake cycle. A possible explanation for this is that the majority of candidates who tend to choose to take the test in English are speakers of English as an additional language (rather than as a home language) and regard themselves as more proficient in English than in Afrikaans, whereas the majority of those who write the test in Afrikaans are Afrikaans home language speakers, which might have contributed to this difference.

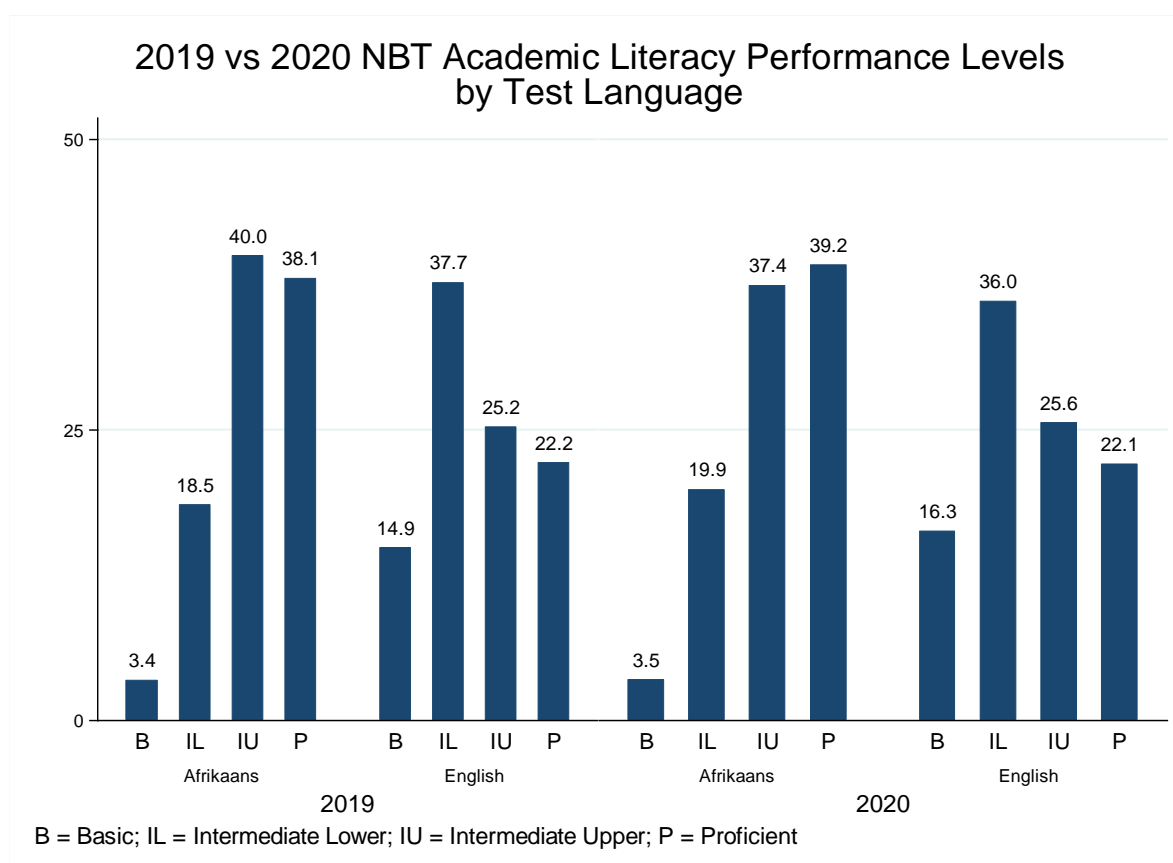


Figure 62 AL performance of Afrikaans candidates 2019 and 2020 intake cycles

The proportion of candidates who wrote the QL test in Afrikaans is small. These candidates are most likely first language speakers of Afrikaans or candidates who intend studying in Afrikaans. The candidates who wrote the QL tests in English comprised a larger proportion of the total writers. These

included English first language speakers as well as second and third language speakers of English.

The proportion of candidates who wrote the QL test in Afrikaans and whose scores were in the Proficient performance band increased slightly from 25.0% in 2019 to 26.2% in 2020. For the candidates who wrote the test in English there was a decrease in the proportion in the Proficient category from 11.3% in 2019 to 9.4% in 2020. There was a slight increase in the proportion of candidates who wrote in Afrikaans and whose scores were within the Basic performance band from 22.2% in 2019 to 23.7% in 2020. For those who wrote in English there was a slight increase in the proportion in the Basic performance band from 46.3% in 2019 to 47.3% in 2020.

Overall, the pattern of performance for both language groups stayed fairly the same and the candidates who wrote the QL test in Afrikaans performed better than those who wrote it in English.

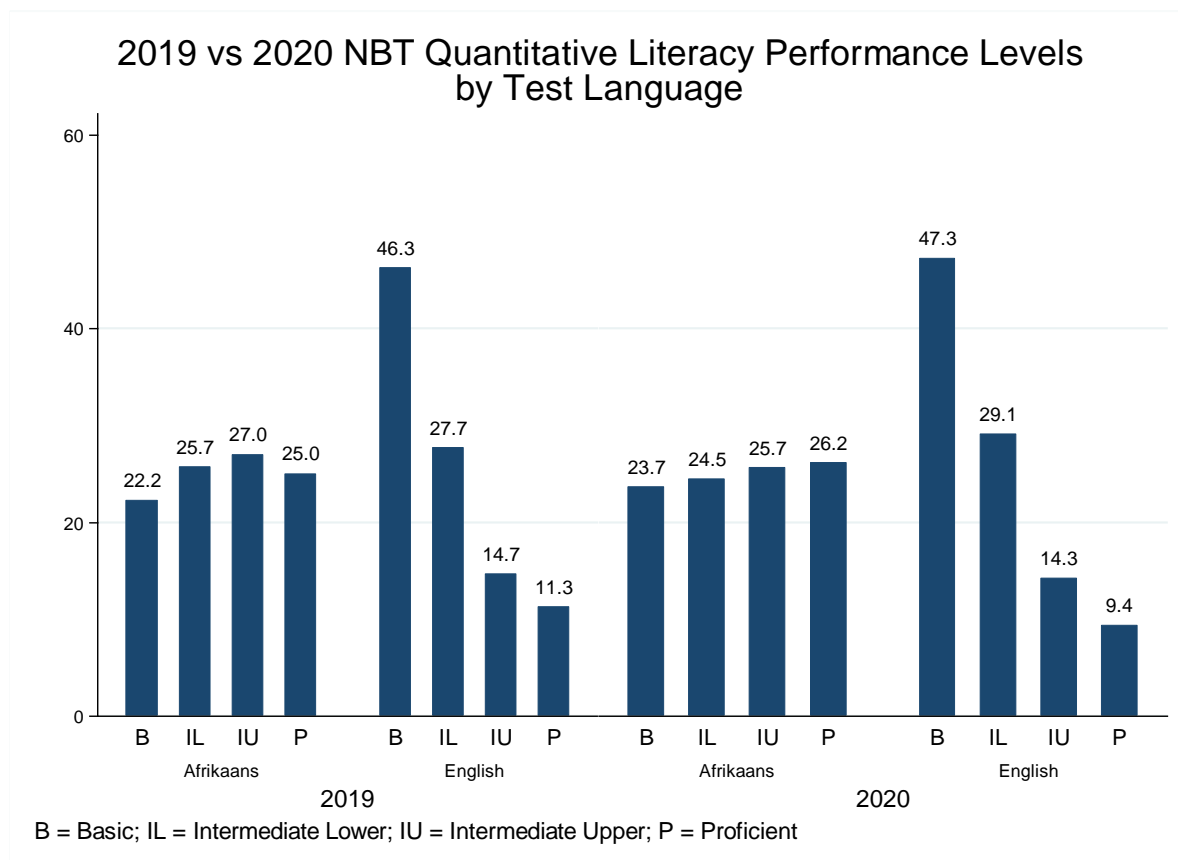


Figure 63 QL performance of Afrikaans candidates NBT 2019 and 2020 intake cycles

In both the 2019 and 2020 intake cycles, the candidates who wrote the MAT test in Afrikaans outperformed the candidates who wrote the MAT test in English and had smaller proportions of students in the Basic category. The differences remained large: in 2019, 24.4% of the Afrikaans candidates had scores in the Basic band, compared to the 54.6% of the English cohort; 21.9% of the Afrikaans candidates' scores were in the Proficient band compared to 8.6% in the case of the candidates who wrote in English. In 2020 we see 25.6% of the Afrikaans candidates and 53% of the English candidates had scores in the Basic band; 22.8% of the Afrikaans cohort and 8.9% of the English cohort had scores in the Proficient band. Note however that the proportions of candidates in the two language groups differ considerably as the Afrikaans group comprised only 7% of the cohort. The Afrikaans group most likely represents a more homogeneous population, in that their first language is probably Afrikaans. Those who wrote the test in English are representative of all the other language groups. These results are illustrated in Figure 28 below.

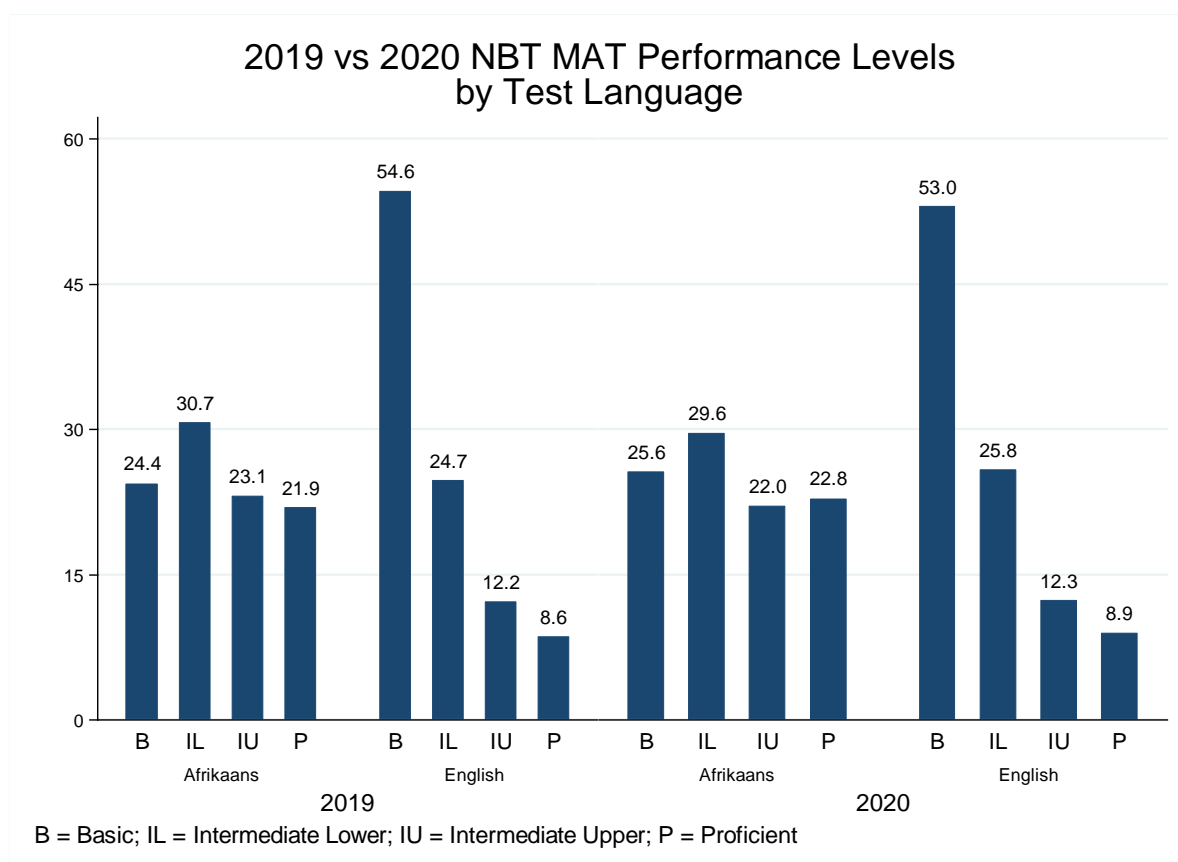


Figure 64 MAT performance of Afrikaans candidates NBT 2019 and 2020 intake cycles

Citizenship

Figure 29 below depicts a comparison of performance on the NBT AL by South African citizens and non-South African citizens in the 2019 intake cycle and 2020 intake cycle. As can be seen from the graph, for the 2019 intake, more South Africans were in the Basic category (14.4%) than non-South Africans (5.2%), more South Africans were in the Intermediate Lower category (36.6%) than the non-South African writers (27.6%), more non-South Africans were in the Intermediate Upper band (37.5%) than their South African counterparts (25.8) and more non-South Africans were in the Proficient band (29.7%) than South Africans (23.1%).

For the 2020 intake, more South Africans were in the Basic category (15.9%) than non-South Africans (5.3%), more South Africans were in the Intermediate Lower category (35.4%) than the non-South African writers (23.9%), more non-South Africans were in the Intermediate Upper band (37.8%) than their South African counterparts (25.9) and more non-South Africans were in the Proficient band (32.9%) than South Africans (22.8%).

It is clear from this graph that in general, non-South African candidates performed better on the NBT AL than South African candidates both in the 2019 intake cycle and the 2020 intake cycles.

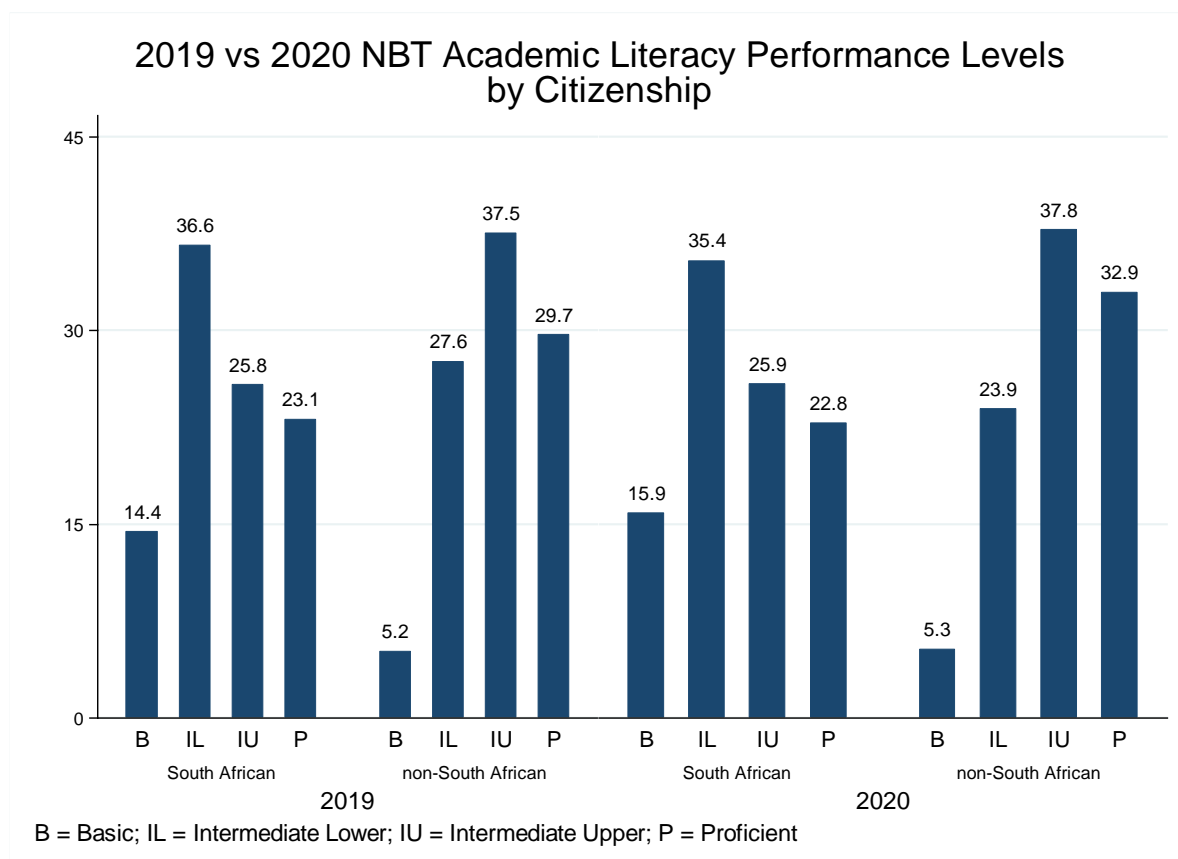


Figure 65 NBT Academic Literacy performance levels by citizenship

In terms of performance in QL, the non-South African candidates outperformed the South African candidates in both the 2019 and 2020 Intake cycles. In both years, the proportion of non-South African candidates (18.4% and 17.2% respectively) whose scores were in the Proficient performance band was higher than for the South African candidates (12.1% and 10.3%). There has been a slight increase in the proportion of QL candidates with scores in the Basic band for non-South African candidates over the two years, from 26.8% to 27.2%. In terms of the South African candidates, there was a slight increase, from 45.3% to 46.5%). The fact that the non-South Africans are performing better in QL than the South African candidates could possibly be ascribed to the differences in the schooling systems in the respective countries, although it is most likely an effect of the South African universities drawing high achieving candidates from elsewhere.

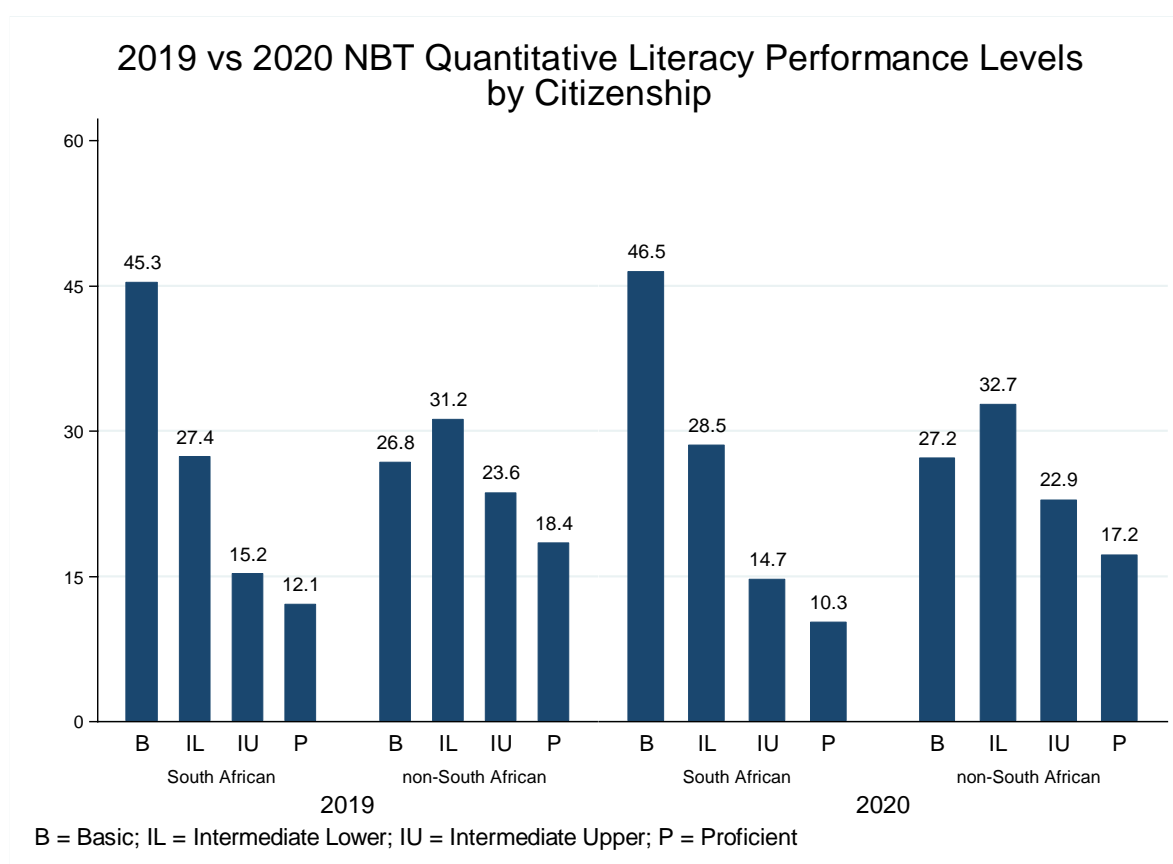


Figure 66 NBT Quantitative Literacy performance levels by citizenship

In both 2019 and 2020, non-South African candidates performed better overall in the MAT tests than the South African candidates. The difference in performance between the two years, for the two groups, is more noticeable in the proportion of candidates with scores in the Basic performance band and the Intermediate bands than it is for the Proficient band. In 2019, in the Basic category, there was a difference of 10.8 percentage points in the proportion of the South African candidates (52.7%) compared to non-South African candidates (41.9%). In 2020 this difference in the proportion of candidates in the Basic category was 12.3 percentage points, with 51.6% and 39.3% for the South African and non-South African candidates respectively. In the Intermediate category (considering both

Lower and Upper Intermediate together) there is a difference between the two groups: 9.7 percentage points in 2019 and 9.8 percentage points in 2020 and in both years the non-South African writers had the higher proportion of candidates in these bands. In terms of the Proficient category there is also a difference in performance between the two groups: in 2019 the difference between the two groups was 1.1 percentage points – 10.7% of the non-South African candidates and 9.6% of the South African candidates – and in 2020 it was 2.4 percentage points (12.2% and 9.8% of the non-South African and South African candidates respectively).

The larger differences at the Basic and Intermediate levels may indicate differences in schooling or again be the result of our institutions attracting high achieving students from other countries.

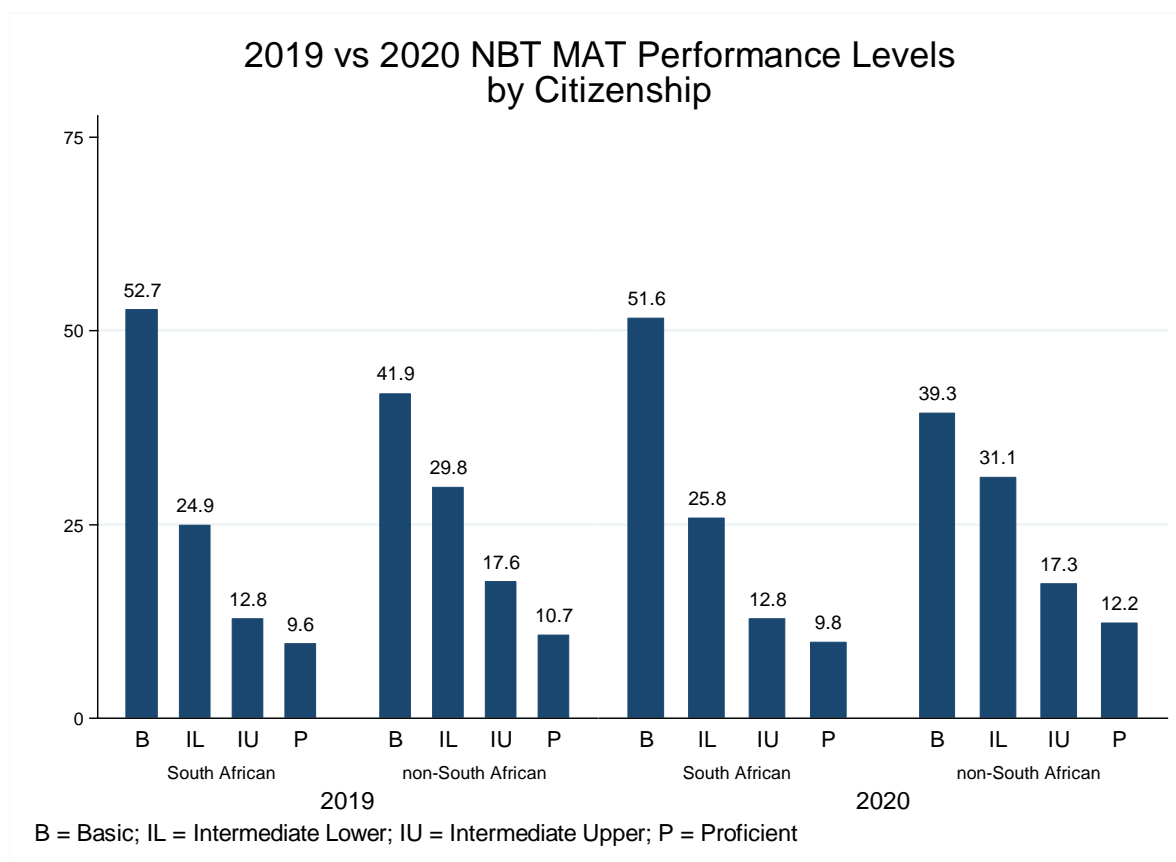


Figure 67 NBT MAT performance levels by citizenship

8. NBT BENCHMARKS

There are very noticeable differences in the NBT performance of candidates who passed the NSC at the bachelor's degree level (classified using NBT degree benchmarks) and those who passed the NSC at the diploma/higher certificate level (classified using NBT diploma/higher certificate benchmarks).

For **AL**, while just over a quarter of bachelor degree candidates had scores in the Proficient band, approximately 8% of the diploma/higher certificate candidates had scores in the Proficient band. Approximately 70% of diploma/higher certificate candidates had scores in the Intermediate Lower or Basic bands.

In **QL** the pattern is slightly different, with proportionally more diploma/higher certificate than degree candidates in the Basic and Intermediate Lower categories, and proportionally fewer in the Intermediate Upper and Proficient bands.

For **MAT**, about 13% of the bachelor degree candidates had scores in the Proficient band; almost 92% of the diploma/higher certificate candidates had scores in the Basic band.

These results are shown in Table 20 and Figure 70 below.

Table 20 Frequency tables of benchmark bands for the NBT domains

AL	Basic	Intermediate Lower	Intermediate Upper	Proficient	Total
AL					
Bachelor's n	4,532	15,413	13,909	13,502	47,356
%	9.570	32.55	29.37	28.51	100
Diploma/Certificate n	959	5,664	2,146	752	9,521
%	10.07	59.49	22.54	7.900	100
QL					
Bachelor's n	17,142	15,209	8,701	6,330	47,382
%	36.18	32.10	18.36	13.36	100
Diploma/Certificate n	5,017	3,979	466	59	9,521
%	52.69	41.79	4.890	0.620	100
MAT					
Bachelor's n	15,794	11,400	6,023	4,808	38,025
%	41.54	29.98	15.84	12.64	100
Diploma/Certificate n	6,066	459	30	7	6,562
%	92.44	6.990	0.460	0.110	100

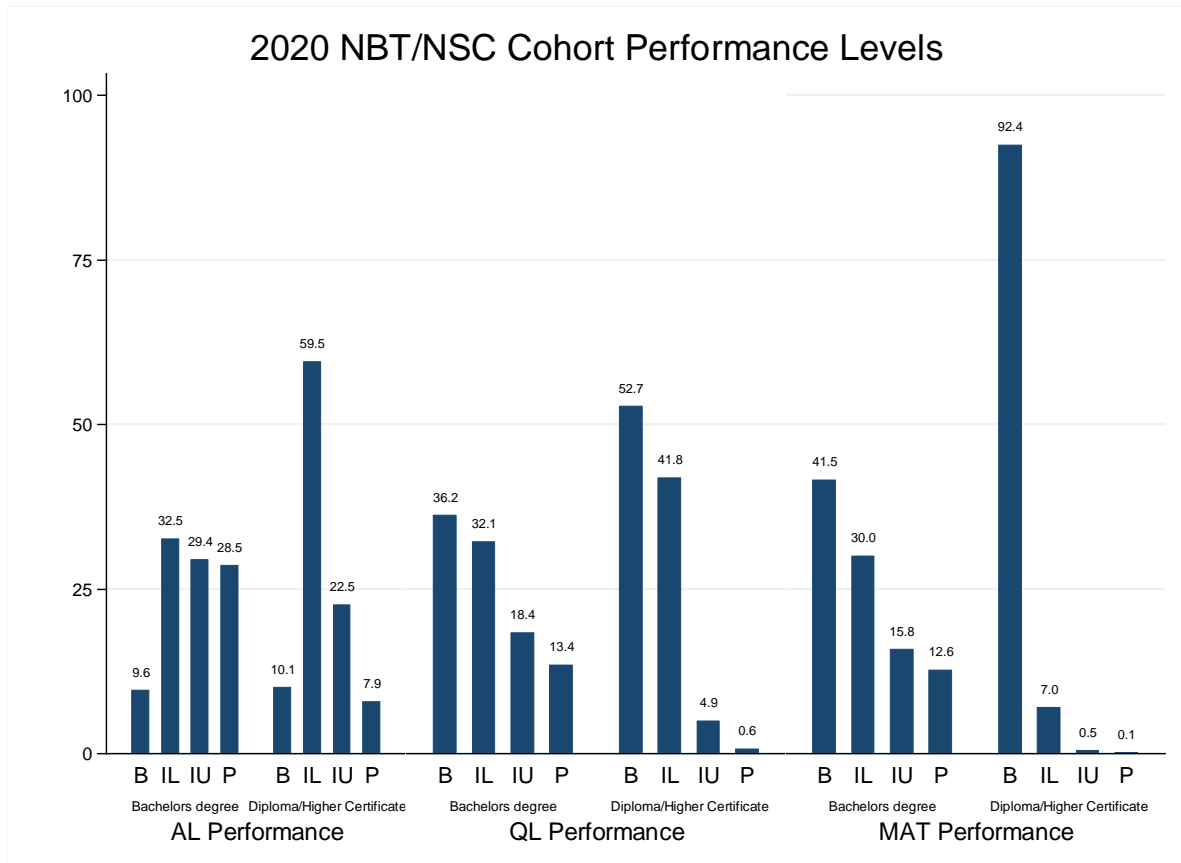


Figure 68 NSC cohort performance levels on NBT

8.1 ASSOCIATIONS BETWEEN SCORES ON THE NATIONAL BENCHMARK TEST IN ACADEMIC LITERACY AND THE NATIONAL SENIOR CERTIFICATE EXAMINATION FOR ENGLISH

Figures 71 and 72 (and Tables 21 and 22) depict associations between scores on the National Benchmark Test in Academic Literacy (NBT AL) and scores on the NSC English Home Language (NSC ENHN) and NSC English First Additional Language (ENFN) for two subgroups, those who achieved an NSC with a Bachelor degree pass and those who achieved an NSC with a Diploma or Certificate pass, of 2020 intake Higher Education students who wrote the NSC in 2019.

Figure 71 shows the scatterplot of NBT AL scores against NSC English Home Language (ENHN) scores for candidates who achieved the NSC with Bachelor pass as well as those who achieved the NSC with Diploma or Higher Certificate pass. There was a correlation of 0.698 between NSC English Home Language and NBT AL for those with a Bachelor degree pass and a correlation of 0.6259 between NSC English Home Language and NBT AL for Diploma/Certificate candidates. Candidates who obtained the NSC with a Bachelor degree pass and performed well in the NSC English Home Language (80% and above) had varying levels of performance on the NBT AL. Candidates who achieved either a Diploma or Higher Certificate NSC pass performed fairly poorly on both the NSC English Home Language and NBT AL. The figure shows that these candidates, even though they took the NSC English Home Language subject, are largely not prepared for the typical academic literacy demands of academic study.

Table 21 Correlation matrix for the 2019 NSC and 2020 NBT results, Bachelor's degree

Bachelor's	NBT AL	NBT QL	NBT MAT	NSC MTHN	NSC MTLN	NSC ENHN	NSC ENFN	NSC PSCN
NBT AL	1							
	47356							
NBT QL	0.7151	1						
	47353	47382						
NBT MAT	0.5402	0.7291	1					
	38025	38025	38025					
NSC MTHN	0.3973	0.6089	0.7892	1				
	39411	39428	37367	39429				
NSC MTLN	0.6018	0.6662	0.4180	0.6680	1			
	8061	8070	772	211	8072			
NSC ENHN	0.6980	0.5846	0.5399	0.5408	0.5840	1		
	25363	25387	19656	20472	5096	25389		
NSC ENFN	0.6529	0.5007	0.4312	0.3534	0.4550	.	1	
	21993	21995	18369	18957	2976	0	21996	
NSC PSCN	0.2531	0.4164	0.6332	0.8128	0.5154	0.5207	0.3735	1
	32461	32469	31381	32376	101	15638	16832	32470

Table 22 Correlation matrix for NSC 2019 and NBT 2020 results, Diploma/Higher Certificate

Diploma/ Higher Certificate	NBT AL	NBT QL	NBT MAT	NSC MTHN	NSC MTLN	NSC ENHN	NSC ENFN	NSC PSCN
NBT AL	1							
	9521							
NBT QL	0.5846	1						
	9521	9521						
NBT MAT	0.2660	0.3736	1					
	6562	6562	6562					
NSC MTHN	0.1198	0.2737	0.3962	1				
	6878	6878	6233	6878				
NSC MTLN	0.4221	0.4654	0.1548	0.6134	1			
	2588	2588	295	6	2588			
NSC ENHN	0.6259	0.4375	0.1672	0.1029	0.2719	1		
	4211	4211	2594	2683	1495	4211		
NSC ENFN	0.5341	0.2548	-0.0340	-0.0446	0.2993	.	1	
	5310	5310	3968	4195	1093	0	5310	
NSC PSCN	-0.0393	0.0412	0.1941	0.5327	0.1163	-0.0069	-0.0550	1
	5555	5555	5123	5491	65	1920	3635	1

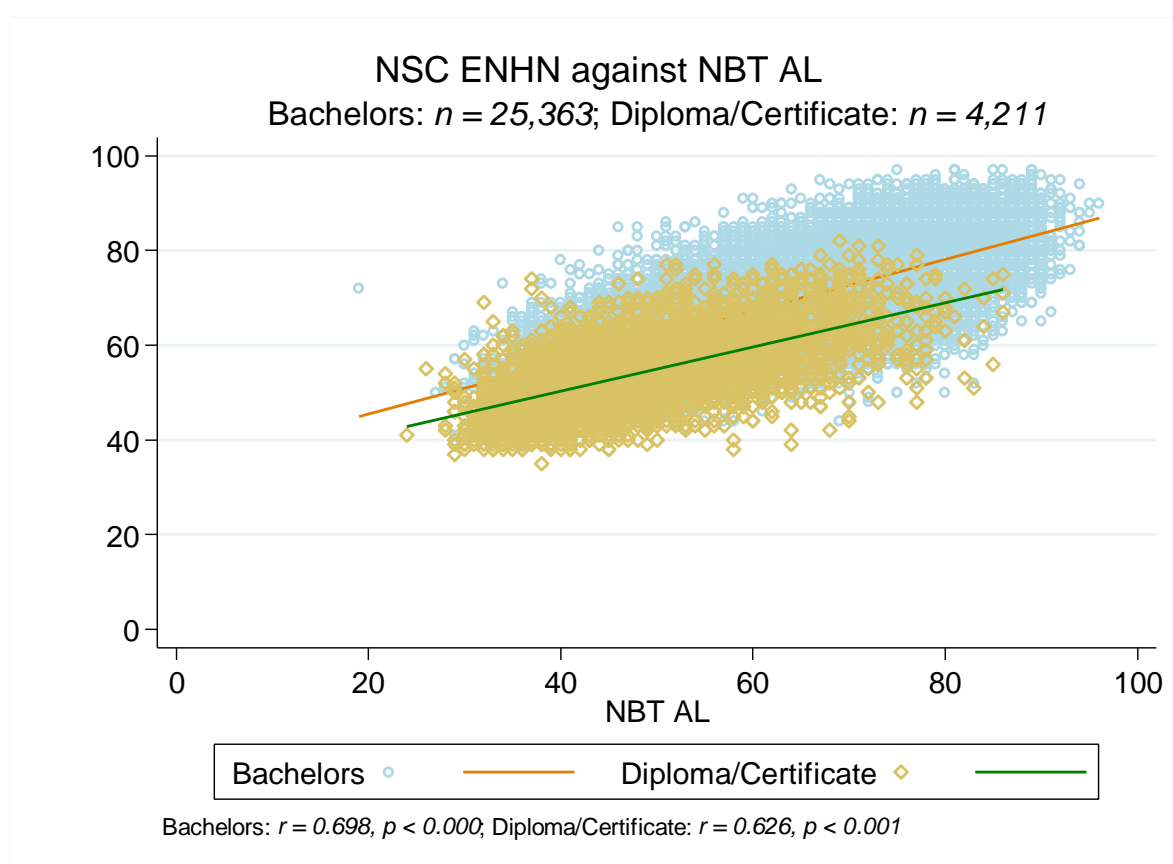


Figure 69 NSC ENHN against NBT AL

Figure 72 shows the scatterplot of NBT AL scores against NSC English First Additional Language (ENFN) scores for candidates who achieved an NSC with either a Bachelor degree-level pass or Diploma/Certificate level pass who took the NSC English First Additional Language Examination.

The candidates who received a Bachelor pass and performed at a Proficient level in the NBT AL also performed well on the NSC English First Additional Language examination. This is also supported by the reasonably strong correlation of 0.6529 between the NSC English First Additional Language scores and NBT AL scores for the candidates who obtained a Bachelor pass. The candidates who performed exceptionally well on the NSC English First Additional Language examinations with scores of 80% and above had varying scores on the NBT AL test. A large proportion of candidates with a Bachelor pass fall within the NBT AL Intermediate band. Most of the candidates who obtained a Diploma/Certificate pass performed equally poorly on the NSC English First Additional Language and NBT AL test. This is supported by the correlation coefficient of 0.5341. The figure shows that the majority of these candidates, even though they took the NSC English First Additional Language as a subject, are largely not prepared to cope with the typical academic literacy demands of academic study and they will have severe challenges at university.

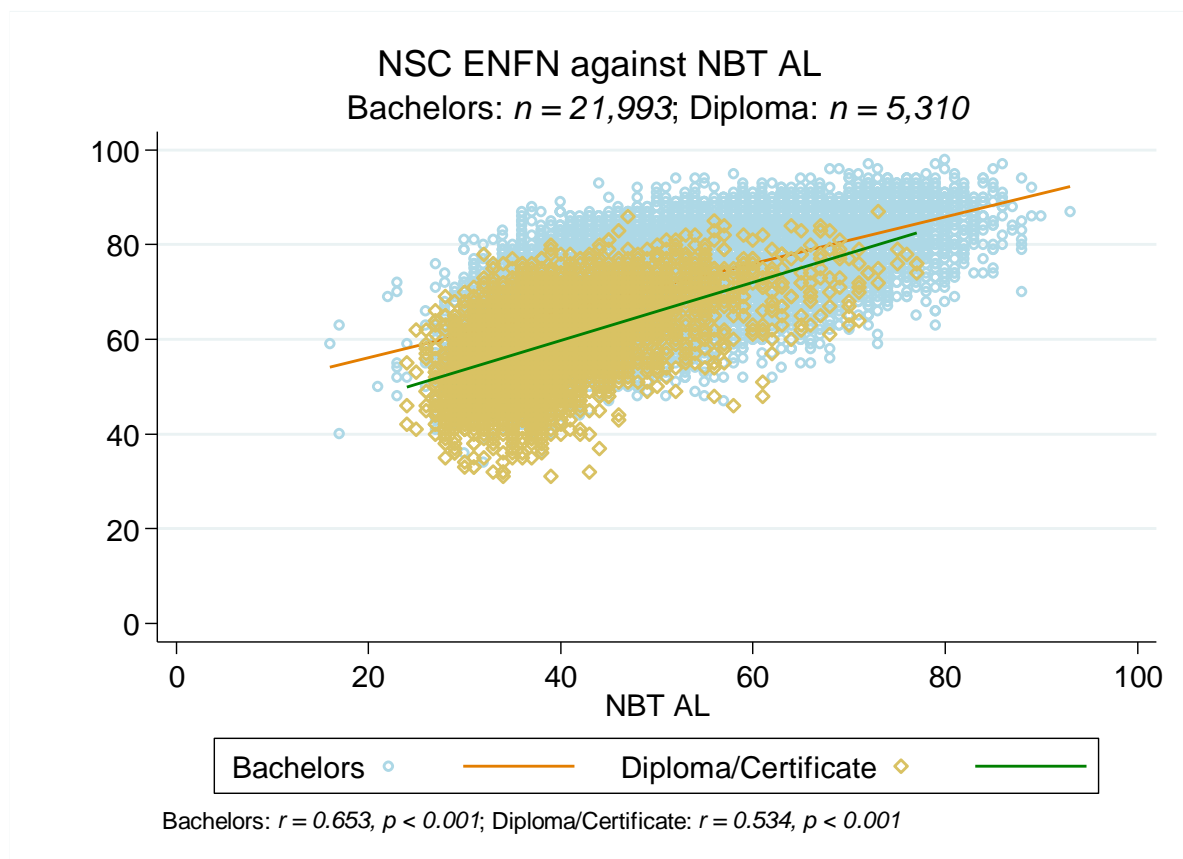


Figure 70 Scatterplot NBT AL vs NSC English First Additional Language

8.2 ASSOCIATIONS BETWEEN SCORES ON THE NATIONAL BENCHMARK TEST IN QUANTITATIVE LITERACY AND THE NATIONAL SENIOR CERTIFICATE EXAMINATION FOR MATHEMATICS AND MATHEMATICAL LITERACY

Figures 73 and 74 depict associations between scores on the National Benchmark Test in Quantitative Literacy (NBT QL) and scores on the NSC Mathematics (NSC MTHN) and NSC Mathematical Literacy (NSC MTLN) for two subgroups, those who achieved an NSC with a Bachelor's degree pass and those who achieved an NSC with a Diploma or Higher Certificate pass, of 2020 intake Higher Education students who wrote the NSC in 2019.

Figure 73 shows the scatterplot of NBT QL scores against NSC Mathematics (NSC MTHN) scores for students who achieved a Bachelor's degree level pass as well as those who achieved a Diploma/Certificate-level pass who took the NSC Mathematics examination. There was a correlation of 0.609 between NSC Mathematics and NBT QL for the Bachelor degree and a mere 0.274 correlation between NSC Mathematics and NBT QL for Diploma/Certificate candidates. Candidates who obtained the NSC with a Bachelor's degree pass and performed well on the NSC Mathematics examination, (80% and above), had varying levels of performance on the NBT QL. This was the case for a large portion of these candidates. It can also be clearly seen that even though these candidates performed well on school-leaving Mathematics (NSC MTHN) they will struggle with the quantitative literacy demands of higher education. This figure also clearly shows the complementarity of the information provided by the NBT QL to that provided by the NSC Mathematics (NSC MTHN). Candidates who achieved a Diploma or Higher Certificate NSC pass performed poorly on both the NSC Mathematics and NBT QL. The figure shows that these candidates, even though they did the NSC Mathematics subject, are largely not prepared to cope with the typical quantitative literacy demands of academic study.

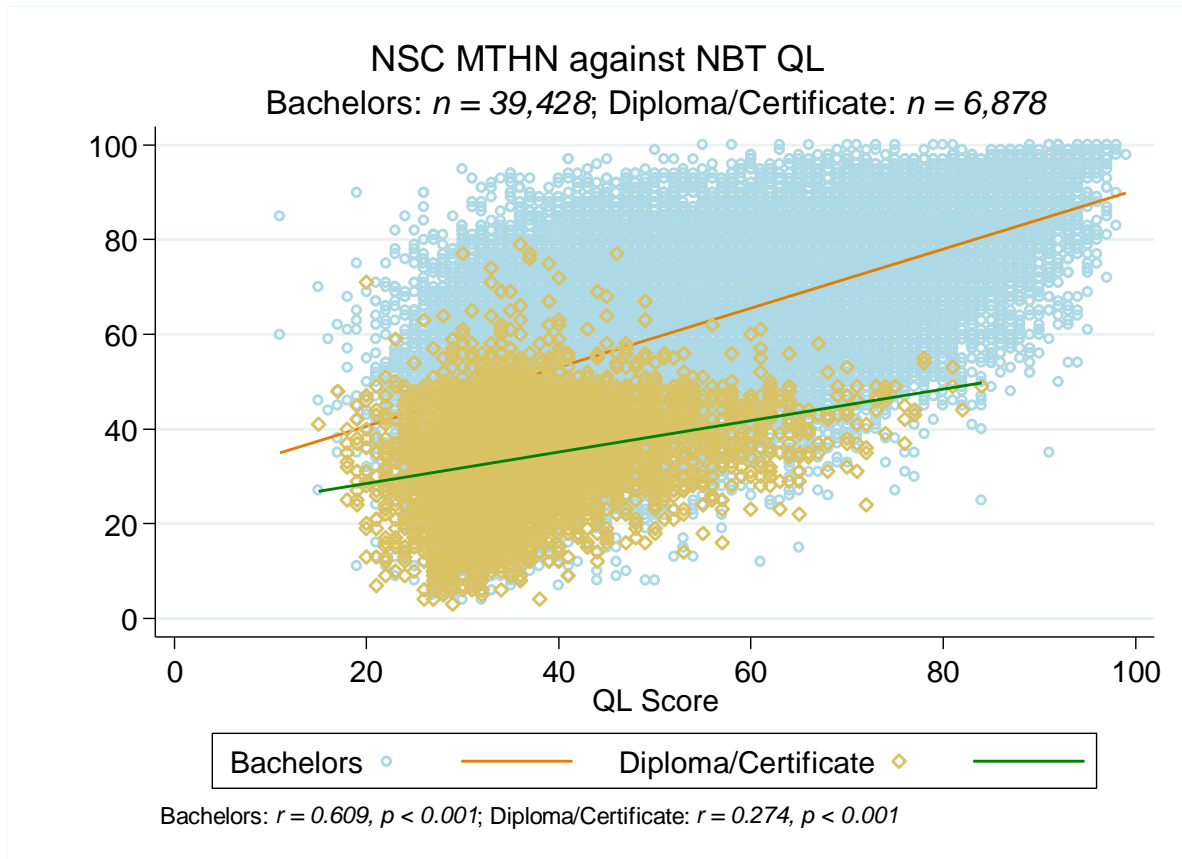


Figure 71 Scatterplot NBT QL vs NSC Mathematics

Figure 74 shows the scatterplot of NBT QL scores against NSC Mathematical Literacy (NSC MTLN) scores for students who achieved an NSC with either a Bachelor's degree level pass or a Diploma/Certificate level pass who took the NSC Mathematical Literacy examination.

A very small number of candidates who received a Bachelor's level pass and were Proficient in the NBT QL also performed very well in the NSC Mathematical Literacy test. The relationship between Mathematical Literacy (NSC MTLN) and QL is clearly not linear and so the correlation between them of 0.6662 for the candidates who obtained a Bachelor level pass must be interpreted with caution. The candidates who performed very well in the NSC Mathematical Literacy examination with scores of 80% and above had varying scores on the NBT QL test. A large proportion of candidates with a Bachelor level pass fall within the NBT Intermediate band. Most of the candidates who obtained a Diploma/Certificate pass performed equally poorly on the NSC Mathematical Literacy and NBT QL test, which is supported by the correlation coefficient of 0.4654. The figure shows that the majority of these candidates, even though they did the NSC Mathematical Literacy as a subject, are largely not prepared to cope with the typical quantitative literacy demands of academic study and they will have severe challenges at university.

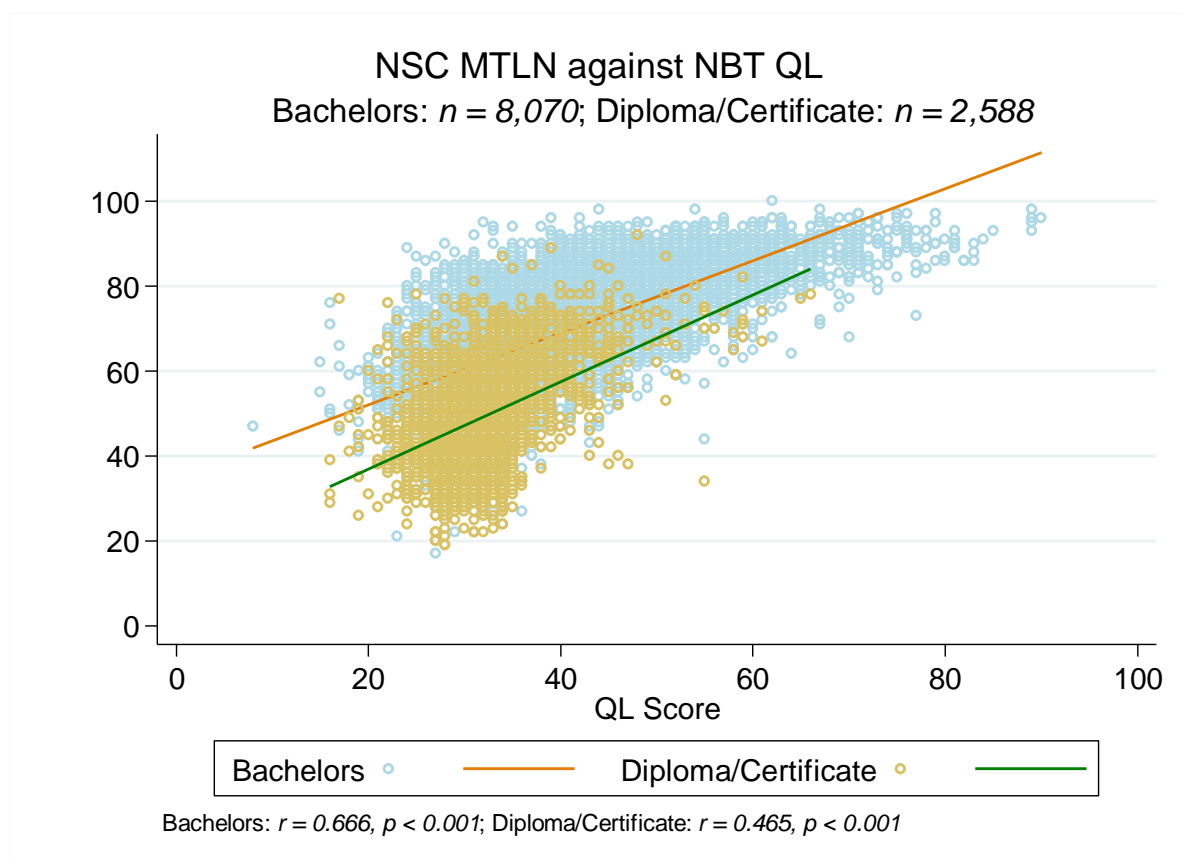


Figure 72 Scatterplot NBT QL vs NSC mathematical Literacy

8.3 ASSOCIATIONS BETWEEN SCORES ON THE NATIONAL BENCHMARK TEST IN MATHEMATICS AND THE NATIONAL SENIOR CERTIFICATE EXAMINATION FOR MATHEMATICS AND PHYSICAL SCIENCE

Figure 75 depicts the association between scores on the NBT MAT and scores on the NSC Mathematics (NSC MTHN) for those who achieved an NSC at a Bachelor's degree level in 2019.

There was a correlation of 0.7892 between NSC Mathematics and NBT MAT for the Bachelor's degree candidates. Candidates who obtained the NSC with a Bachelor's degree pass and performed well on the NSC Mathematics examination, (80% and above), had varying levels of performance on the NBT MAT. The figure shows that there are many candidates who did well in the NSC Mathematics but whose scores lie in the Intermediate bands, and even some with scores in the Basic band. This could be indicative of the fact that repeated exposure to past NSC MTHN examination papers may help candidates to be successful in passing an examination, but less successful in acquiring the skills and competencies needed for higher education. Many NSC Mathematics high achievers may in fact be unprepared for the typical mathematical demands of higher education. This figure clearly shows that the NBT MAT provides complementary information to that provided by the NSC MTHN.

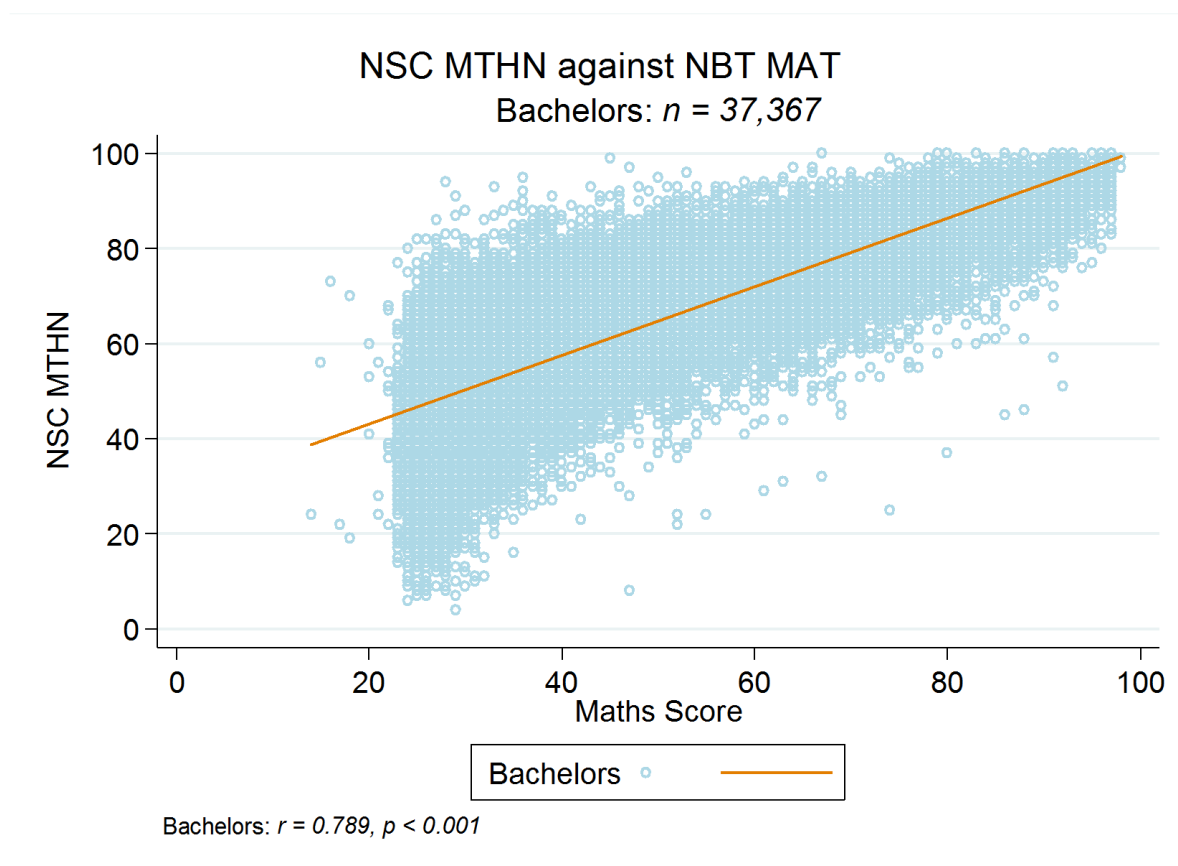


Figure 73 NBT MAT vs NSC MTHN

Figure 76 depicts the association between scores on the National Benchmark Test in Mathematics (NBT MAT) and the scores on the NSC Physical Science (NSC PSCN) for those who achieved an NSC with a Bachelor degree pass, of 2020 intake Higher Education students who wrote the NSC in 2020.

There was a correlation of 0.6332 between NSC Physical Science scores and NBT MAT scores for the Bachelor's degree level candidates. Candidates who obtained the NSC with a Bachelor's degree level pass and performed well on the NSC Physical Science examination, (80% and above), again had varying levels of performance on the NBT MAT. The figure shows that even candidates who did well in the NSC Physical Science (80% and above) are in the Intermediate and Basic NBT MAT categories. One of the strengths of the NBT MAT is its ability to spread the scores of the high-achieving students into bands that are more closely aligned with first year performance patterns. A large number of these students will need substantial support if they are to cope with the typical mathematical demands of science courses in higher education.

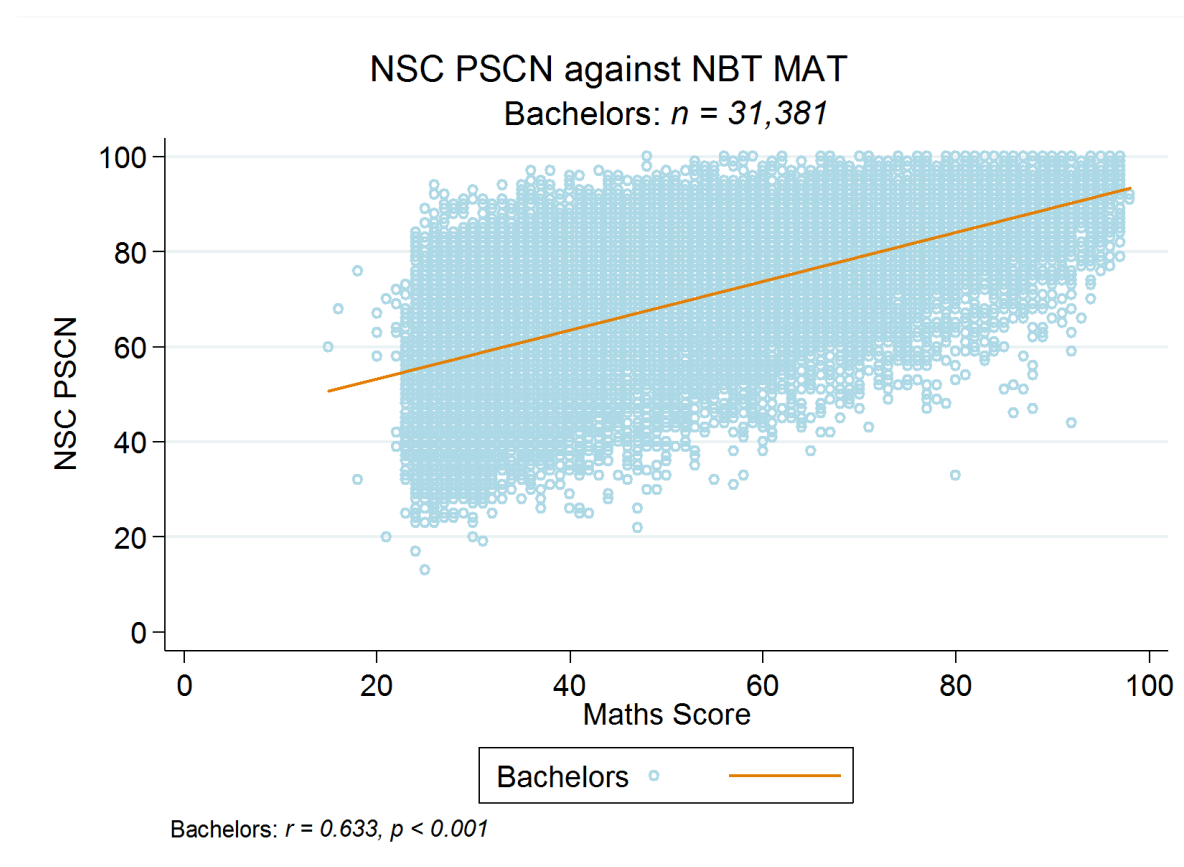


Figure 74 NSC PSCN vs NBT MAT

It is a matter of concern that school leavers (and the same applies to parents and educators) do not recognise the different purposes for which the NSC and NBT were designed. Many people are firmly of the opinion that a high school exit score is representative of adequate preparation for university study. The NBT MAT results resonate more with the experience of lecturers in first year mainstream

mathematics (and cognate disciplines) in that they more closely reflect the trends with regard to pass rates at that level.

9. CONCLUSION

Given data on actual students admitted at institutions, NBT diagnostic information, in the form of subdomain analysis, can provide useful information for teaching and learning. The NBTP team has, since 2015, been running institutional teaching and learning workshops with the purpose of ensuring that the diagnostic information obtained from the tests translates into curriculum development.

This shows that the NBT are important not only for informing student preparedness for university entry but also for guiding teaching and learning, particularly in the first year at university.

The national test score results for the 2019 and 2020 intakes are quite consistent and do not deviate much, thus providing supporting information in the reliability of the tests.

The 2020 intake results show that prospective higher education students perform the worse in the NBT MAT test. This remains a major concern. In general proficiency in all subdomains is below 50%, which is worrying, since most of those who wrote the NBT represent the cream of the students who will ultimately enter university study. Another concern is the extent to which institutions are able to provide the necessary support for the large number of students being admitted who are below the Proficient level in AL, QL or MAT.

More in-depth reports and discussion pieces using NBT data are available as CETAP working papers and can be requested from the Test Development Coordinator.

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