VESP

VANUATU EDUCATION SUPPORT PROGRAM

Analysis of Education Data: A Gender Perspective

May 2020

VERSION: May 27, 2020

GOUVERNEMENT DE LA REPUBLIQUE DE VANUATU
MINISTERE DE L'EDUCATION ET DE LA FORMATION
GOVERNMENT OF THE REPUBLIC OF VANUATU
MINISTRY OF EDUCATION AND TRAINING
Australian Aid
coffey
A TETRA TECH COMPANY

Vanuatu Education Support Program is managed by Coffey, a Tetra Tech company, on behalf of the Australian Government

Table of contents

Annexes

Abbreviations

DFAT	Australian Department of Foreign Affairs and Trade
EAU	Examination and Assessment Unit
GER	Gross Enrolment Rate
GPI	Gender Parity Index
MDG	Millennium Development Goals
MoET	Ministry of Education and Training
NER	Net Enrolment Rate
Open VEMIS	Open Vanuatu Education Management Information System (web based)
STR	Student Teacher Ratio
VANSTA	Vanuatu Standardised Test of Achievement

Tables

Graphs

Executive Summary

This desktop review was commissioned by the Vanuatu Education Support Program Phase II (VESP). It focusses on 12 specific aspects about education in Vanuatu.

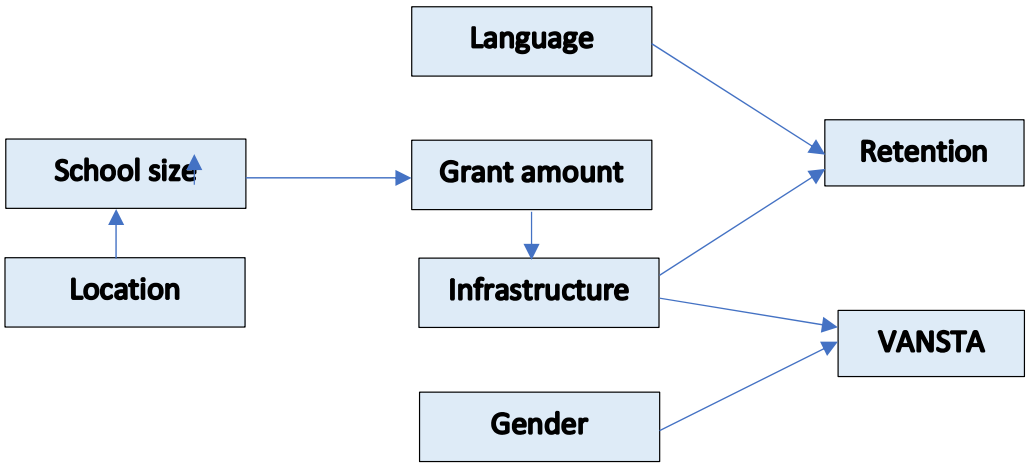
Data was sourced from existing reports and data sets. In particular the MoET Annual Statistical reports, the *Open VEMIS* information management system data and achievement data from past Vanuatu Standardised Tests of Achievement (VANSTA) tests.

The data was combined into 'data frames' which could be used to undertake analysis from both a school perspective and a student enrolment perspective. The twelve specific tasks were addressed, providing information data and analysis of relationships between components such as following individual students from one year to the next or comparing VANSTA results for a school with characteristics of the principal or the level of infrastructure at the school.

Many relationships were identified and some possible relationships were found to be irrelevant.

The review did not consider curriculum, teacher expertise, secondary examination results nor student attendance.

The following diagram illustrates, at a very high-level, the major relationships that were found between the various pieces of educational data when analysed as a part of the report.



The model above shows that addressing infrastructure issues is likely to have the greatest effect of the schooling of boys and girls, Both the language used at a school and the actual gender of a person are fixed.

The following suggestions are made to help take the analysis in this report further and actually contribute to the schooling of boys and girls in Vanuatu.

1. Improving the level of infrastructure at schools needs to become an on-going priority in school, MoET and DFAT planning.

2. The school grant formula could be adjusted to take into account the extra costs associated with being a rural school. The use of the two-state 'urban' and 'rural' classification is very simple. Schools could be formally classified into four groups based on their access to urban centres such as 'urban', 'rural', 'remote' and 'very remote'.

Having such as classification would then allow for the enhancement the funding formulae to help address the mis-balance in levels of infrastructure seen in schools across the country.

3. The number of students in grade 1 for the last three years is about 2000 students greater than would otherwise be expected. This is having, and will continue to have, consequential affects on class numbers in the lower primary grades and will 'bubble' through in future years. As time progresses the 'bubble' will dissipate partially as not all students continue directly from one grade to the next. The MoET will need to plan accordingly, allocating resources to different grades as required.

4. The proportion of students engaging in Junior Secondary education (Year 7 – 10) requires attention. It has barely changed in recent years and is well below the proportion expected. Every boys and girl should be continuing to at least the end of Year. The barriers to boys and girls continuing their education past Grade 6 need to be identified and addressed.

5. Nearly half of the Grade 6 students do not continue directly into Grade 7. Many students seem to be having trouble transitioning from their Year 6 school directly to their local Junior Secondary school for year 7. The proportion of students from French language schools is even greater at 56% not continuing directly.

   A quarter of the students enter Grade 7 after a break of one year or more, indicating that, having taken a break, many of the ex-Grade 6 students are finally ready for Grade 7. The Grade 6 to 7 transition is the point of the greatest loss of students in system. Whilst many eventually return to Grade 7, about a quarter do not.

   Some qualitative research needs to be undertaken to understand the barriers, for boys and for girls, to direct continuation from Grade 6 to 7, A focus should be on those students who need to change schools.

6. It is suggested that MoET reviews the use of existing data quality tools, and develops new tools if necessary, to continually monitor data quality and enhance processes to ensure completeness, in particular the monitoring of new and changed enrolments. This may require the deployment of more staff dedicated to Open VEMIS data quality.

7. Enrolment records in *Open VEMIS* only include 2019 teacher details in 41% of the records. Analysis of gender (and age / experience) of teachers and student achievement requires the links between teacher and student to be known in the vast majority of cases. Having the links in most cases would enable teacher attributes to be associated directly with students, rather than through schools.

   It is suggested that schools be encouraged to link their teachers with their class enrolment data in Open VEMIS.

8. It is suggested an audit of a sample of 'new' older students be undertaken; checking the Open VEMIS database to see if they are indeed 'new' and, if they are, contacting the students to find out why they had not been in school. Depending on the results of the audit, enhanced protocols for creating 'new' students might be developed.

Introduction

This desktop review was commissioned by the Vanuatu Education Support Program Phase II (VESP). It focusses on 12 specific aspects about education in Vanuatu.

Data was sourced from existing reports and data sets. In particular the MoET Annual Statistical reports, the *Open VEMIS* information management system data and achievement data from past Vanuatu Standardised Tests of Achievement (VANSTA) tests.

The report will support further qualitative investigations into the issues of gender in the Vanuatu education system and inform the Ministry with future planning.

The report identifies some issues that were observed from analysing the data and about improvements to the management of data to support future analysis.

The matters to be addressed, derived from the Terms of Reference for the activity (see Annex 6 for the Terms of Reference), are below. Each is addressed in turn within the body of the report, followed by a set of overall observations at the end.

Finally, data tables and other explanatory material relating to the statistical analysis used throughout, are included as a set of annexes at the end of this report.

	Tasks
1.	Outline the GER and NER for all schools in Vanuatu disaggregated by gender, province and school type (primary and secondary, ECCE).
2.	Detail retention rates disaggregated by gender, province and school type.
3.	Detail the total value of school grants provided to all schools disaggregated by province and school type. Is there any evidence suggesting a correlation between school grants and the level of enrolment and retention disaggregated by province and school type?
4.	Number and gender of teachers by province and the correlation of teachers and enrolment and retention rates.
5.	Language type used by schools by province and school type - correlated with the enrolment and retention rates
6.	Correlation between VANSTA results and enrolment and retention rates disaggregated by province and school type.
7.	Does the gender of teachers affect the schooling of boys and girls? If so, how?
8.	Does the gender of principals affect the schooling of boys and girls? If so, how?
9.	What are significant interactions between location (rural and urban) and principals' attributes (gender, level of education, age, experience, etc.) in determining the schooling of boys and girls?
10.	How does infrastructure (access to water, electricity, furniture, etc.) aspects of the schools correlate with the schooling of boys and girls;
11.	What are the correlations between infrastructure and geo-location?
12.	How boys' and girls' performance in the VANSTA correlate to gender variances in GPI, principals' attributes and other school level characteristics?

Approach and Methodology

The first phase of the project was to collect data from relevant sources. Sources of data were -

- The Open VEMIS database. Open VEMIS is the relational database developed and managed by the Ministry of Training and Education (MoET). It holds data about student, teachers, schools. Student data is available from 2015. Access to the data was via the standard user interface available to MoET officers. Reports can be generated in a variety of formats, including EXCEL and text-based CSV.
- The report *MoET Education Statistics - Basic Tables 2019*, produced in March 2020, provided very useful summary data. The tables included were mainly generated from Open VEMIS data. Where data is readily available in this resource it is used in the report.
- Individual student VANSTA results from the VANSTA tests held in 2017 and 2019.
- Results of the recent primary school infrastructure survey
- Population data resulting from the 2016 Mini-Census conducted after Cyclone Pam. In particular, data about the number of boys and girls in each province and each age.

Next, the following tables of data were loaded into a relational database -

- 2015 - 2020 enrolment data containing student name, birthdate, gender, school and grade
- 2019 teachers, including names, birthdates, gender, role and school
- Schools, including name, language, location, island and province.
- School infrastructure scores
- 2017 and 2019 VANSTA results

Next, three data frames were generated, using both data directly taken directly from the above tables and data derived. For example enrolment for a school, whether a student ewas at school the following year, the age of a principal. Details of the components of each data frame are provided at Annex 2

Two school focussed frames containing 2019 data were prepared. One primary and one secondary. The third was an enrolment set, containing every student who was enrolled in any grade from 2015 to 2020.

Copies of the original tables and derived data frames were provided to VESP with this report.

Finally, the report was prepared, focusing on each of the twelve tasks. The data frames were used where appropriate for the task. Analysis and graphical reporting was undertaken using version 1.9.37 of the statistical analysis software package ‘Wizard’.

Report Limitations

The report focusses on student retention in the period 2017 to 2019 as the 2020 data was missing about 30% of enrolments at the time of analysis. Infrastructure data is limited to primary schools. There is some missing data in respect of teachers and principals, infrastructure and VANSTA results. The analysis allows for the missing data when making estimates of significance.

Attendance data in Open VEMIS is largely not available so no attempt was made to use attendance as a measure of schooling.

No consideration has been made of curriculum provision, teacher training or secondary examination results.

Task 1. GER and NER

Outline the GER and NER for all schools in Vanuatu disaggregated by gender, province and school type.

1.1 Gross and Net Enrolments

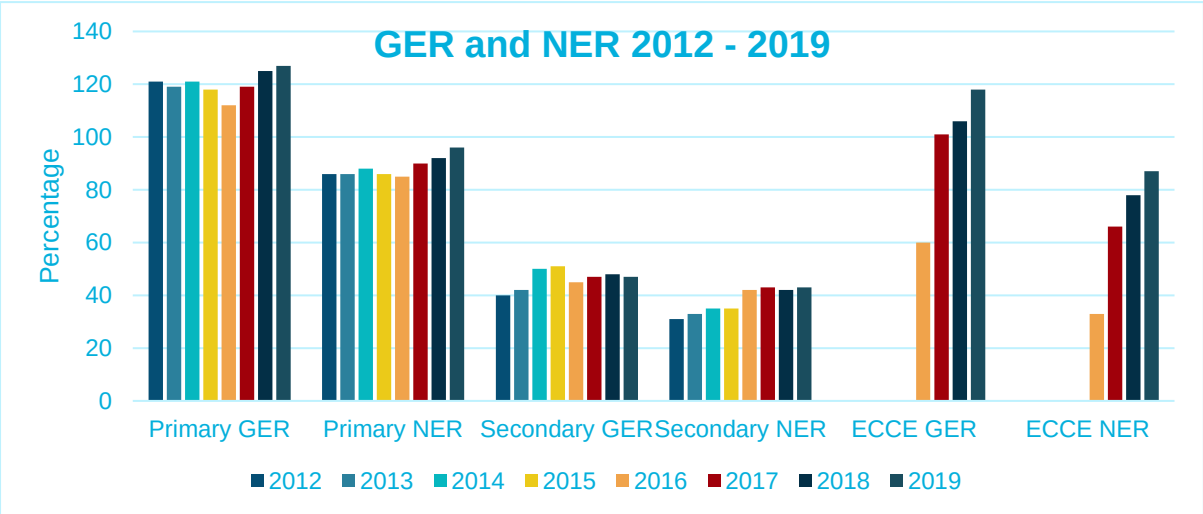
Gross (GER) and Net (NER) Enrolment Rates are measures of engagement with education. They measure the proportion of students in the education system. They were used as a measure of country level achievement of Millennium Development Goal[1] (MDG) #2- universal primary education.

The NER is the percentage of children of relevant school age that are actually enrolled in school. It can be calculated for primary (Grades 1 – 6 and 6 – 11 Grades old), secondary (Grades 7 – 13 and 12 – 18 Grades old) and early childhood (pre-Grade 1 and 4 – 5 Grades old).

The GER is the percentage of all students that are actually enrolled in school. It can be calculated for primary (Grades 1 – 6), secondary (Grades 7 – 13) and early childhood (pre-Grade 1). when compared with the NER it provides an indication of the degree of 'age inappropriate' enrolment.

Calculation of the rates is dependant on accurate and complete school enrolment and census figures being available.

Graph 1.1 - GER and NER by school type – 2012 to 2019



Source MoET Statistics Report 2020

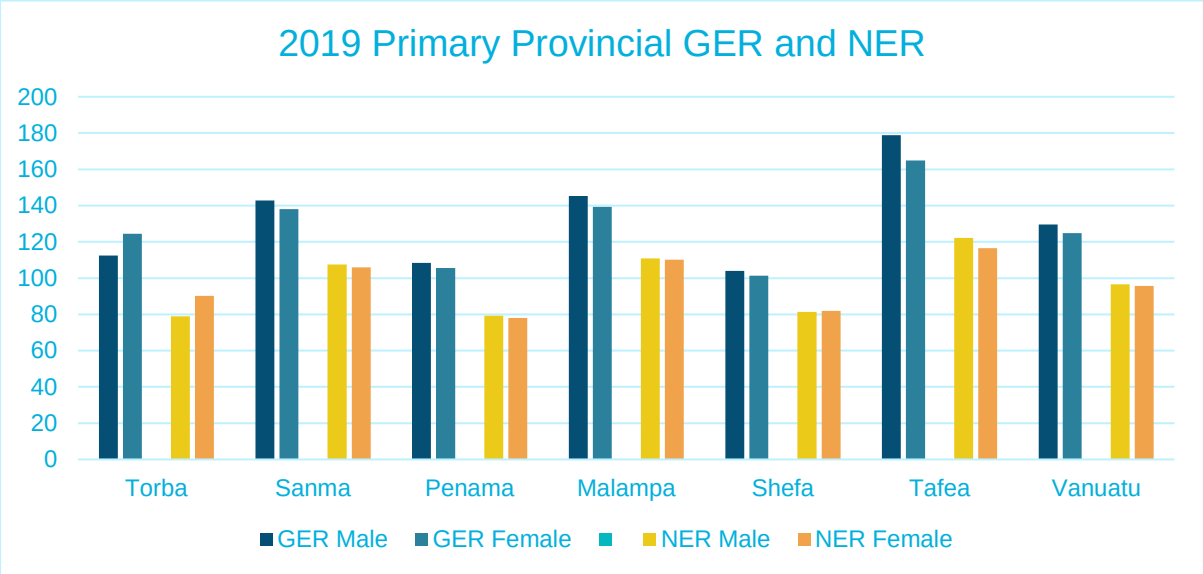
The Primary NER and GER have been steadily improving since 2016. The last four years of the secondary GER and NER have remained stable, showing no growth. The proportion of students in early childhood education has increased steadily over the last four years.

NB: Some of the variations in the time sequence may be attributable to the updated census figures which became available from 2016.

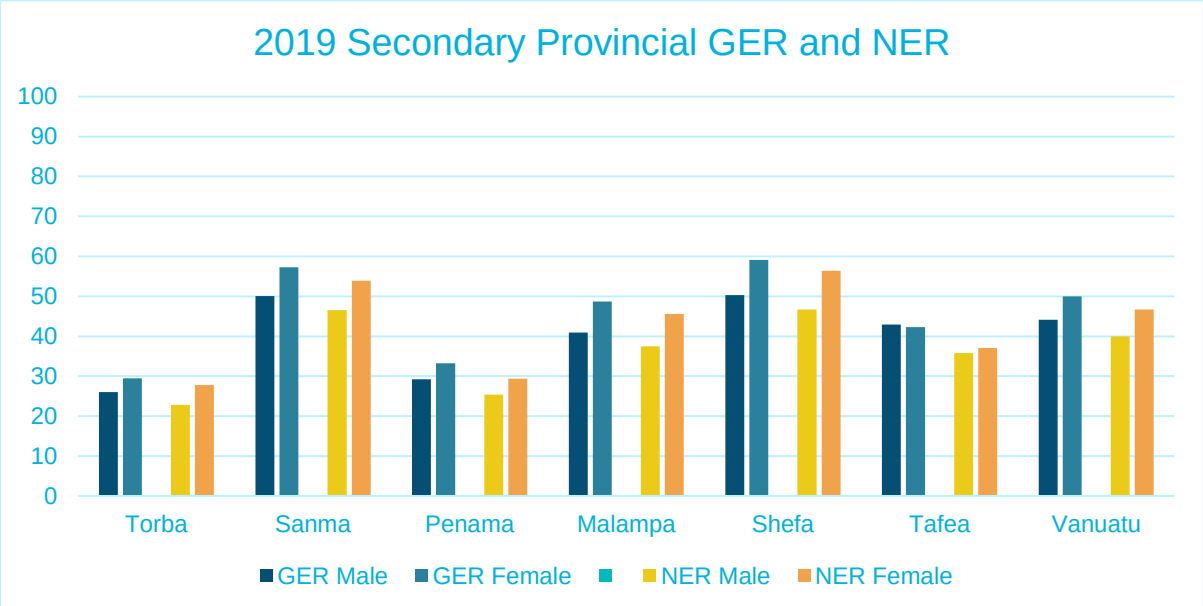
[1] See https://www.un.org/millenniumgoals/

1.2 Provincial and Gender variations

Drilling into the data for 2019 we see that there are differences in the GER and NER for the various provinces and between girls and boys.



Graph 1.2 - 2019 primary GER and NER by province and gender
Source MoET Statistics Report 2020



Graph 1.3 - 2019 secondary GER and NER by province and gender
Source MoET Statistics Report 2020

In primary schools, boys have a higher GER and NER than girls in every province. Of those students who progress to secondary school, the GER and NER for girls is higher than for boys, except for the GER in Tafea.

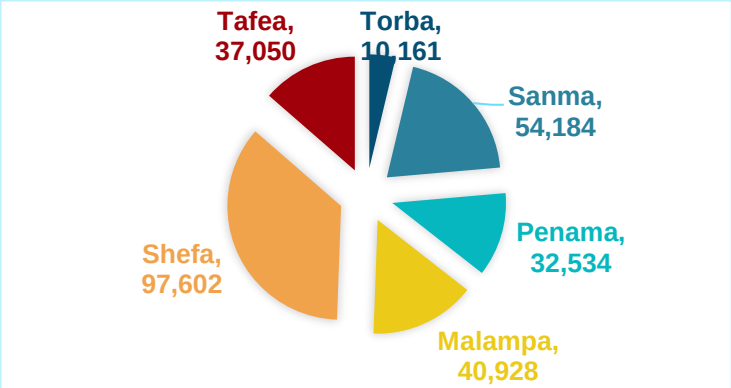
NB: A NER more than 100 suggests the population for some provinces is underestimated (see primary NER for Sanma, Malampa and Tafea).

Overall, the country figures look reasonable and consistent with other nearby countries. Most recent primary NER figures[2] have Australia at 96, Fiji at 97, New Zealand at 99, Samoa at 94, Solomon Islands at 67 and the world average at 89.

1.3 Enrolments

The population of Vanuatu has been steadily increasing. The most recent census, the 2016 Mini Census3, estimated the population as being 272,459. Previously the population was estimated as 234,023 in the 2009 census and 186,678 in the 1999 census.

The United Nations (UN)[4] estimated the population in 2019 to be 299,882. Following the 2009 Census estimates for the population in 2050 were in the range 428 to 659 thousand people. Current UN estimates remain consistent with that range and estimate the current rate of population growth at around 2 – 2.5% per annum, largely due to increased births.

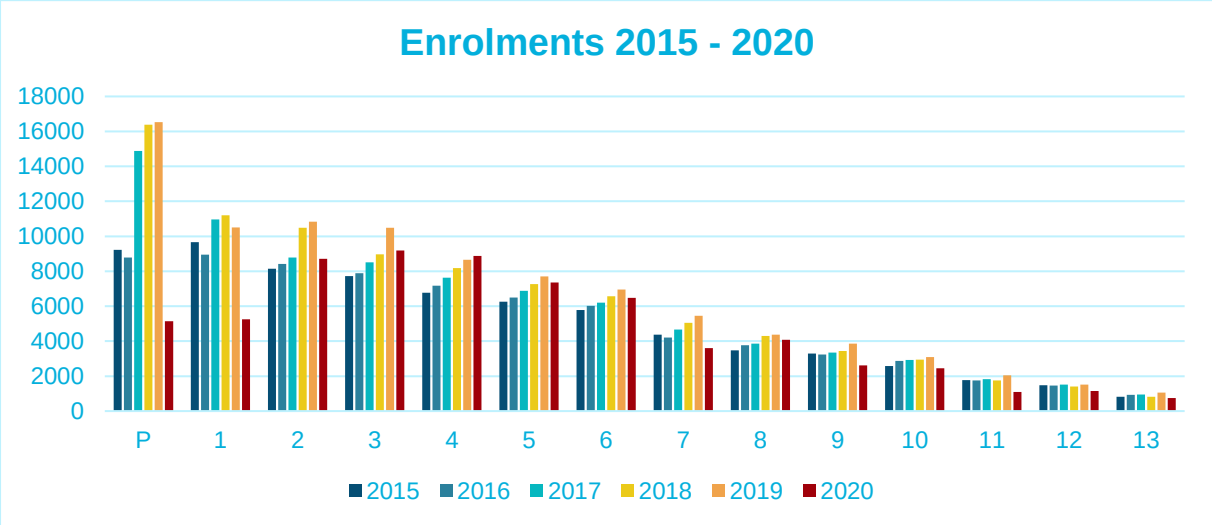


Graph 1.4: Populations by province

Vanuatu is administratively divided into 6 provinces with populations ranging from around 10,000 people (Torba) to nearly 100,000 people (Shefa).

In Vanuatu, students are expected to attend Primary school from when they are 6 Grades old. Before that they are encouraged to attended Early Childhood centres. Education is compulsory until completion of Grade 8. Places are available to all students in Grades 9 and 10.

Enrolment data for the past six years is available from Open VEMIS. The number of students, as recorded in Open VEMIS, from 2015 to 2020 enrolled in each grade is summarised below -



Graph 1.5 – Enrolment by grade 2015 – 2020 *Source: OpenVEMIS April 2020*

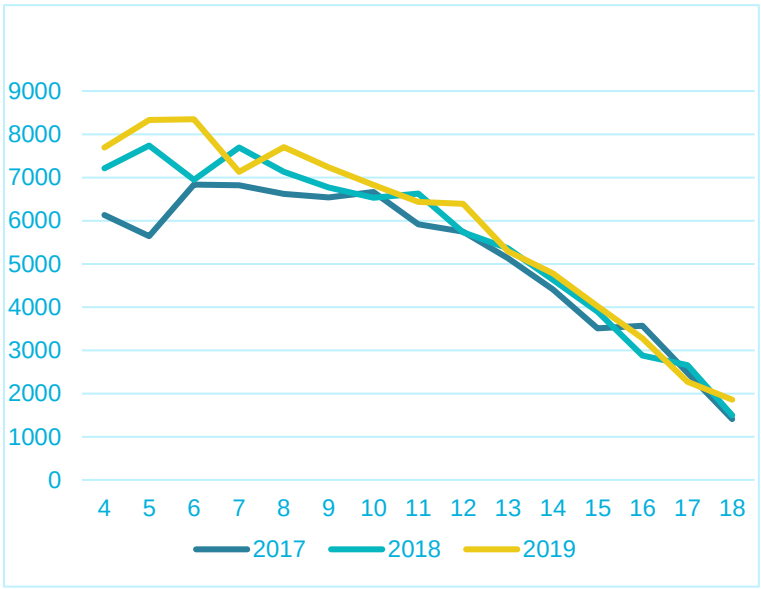
[2] See https://data.worldbank.org/indicator/SE.PRM.N
[3] See 2016 Post TC Pam Mini Census Report Volume 1 p1 available at https://vnso.gov.vu/index.php/census-and-surveys/census/2016-mini-census
[4] http://data.un.org/Search.aspx?q=Vanuatu

The enrolment figures for 2020 (as at April 6, 2020) appear to be incomplete, potentially missing 30,000 or more students. Further, enrolments for 2015 and 2016 may also be understated. Analysis of direct retention from one grade to another by students has been limited to 2017 – 2019.

Early childhood centre (ECCE) and primary school enrolments in the period 2017 – 2019 have steadily increased. Secondary enrolments have remained steady.

Table 1.1: Age enrolment data – *Open VEMIS April 2020*

Age	2017	2018	2019
4	6129	7213	7695
5	**5641**	7738	8331
6	6835	**6942**	8347
7	6818	7693	**7128**
8	6618	7134	7700
9	6540	6769	7237
10	6663	6529	6825
11	5916	6626	6434
12	5743	5728	6393
13	5134	5362	5292
14	4409	4634	4785
15	3512	3891	4019
16	3565	2877	3281
17	2482	2660	2272
18	1408	1496	1857



Graph 1.6: Enrolment data by age

A 'dip' in enrolments of 5 year-olds in 2017 is moving through the system. This 'dip' is not reflected in underlying population figures.

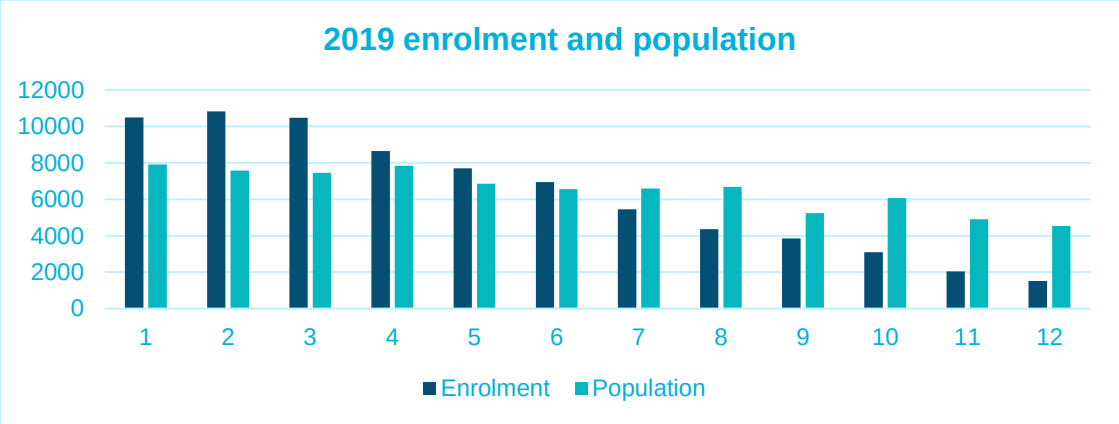
1.3.1 Starting age

A MoET campaign "*Grade 6 – Klas 1*", held over the last few years, has had a marked effect on encouraging parents to start their children at school when they turn six years old. The average age of a Grade one student has dropped by about 8 months in the period 2016 - 2019. This has had consequential affects on class numbers in the lower primary grades, as is seen in Graph 1.7 below.

Grade	2015	2016	2017	2018	2019	2020
1	6.5	6.5	6.3	6.0	5.8	5.8
2	7.8	7.7	7.7	7.5	7.1	6.9
3	9.1	9.0	8.9	8.8	8.6	8.2
4	10.2	10.1	10.1	10.0	9.8	9.6
5	11.2	11.2	11.2	11.1	11.0	10.9
6	12.2	12.2	12.2	12.2	12.1	12.0

Table 1.2 Average age (at January 1 of Grade)

In 2019 the actual number of students in each grade exceeded the expected number[5] (based on ages) for Grades 1 – 4.



Graph 1.7:- Class enrolment data – *Open VEMIS April 2020*

1.4 Discussion and Analysis

The Primary NER and GER have been steadily improving since 2016. Secondary GER and NER has shown no improvement. The proportion of students in early childhood education has increased steadily over the last four years.

Overall, the country's primary NER is consistent with other nearby countries. Most recent primary NER figures have Australia at 96, Fiji at 97, New Zealand at 99, Samoa at 94, Solomon Islands at 67 and the world average at 89.

In primary schools, boys have a higher GER and NER than girls in every province. Of those students who progress to secondary school, the GER and NER for girls is higher than for boys, except for the GER in Tafea.

1.4.1 Implications for the future

- With the average age of a Grade one student dropping by about 8 months in the period 2016 – 2019, the number of students in grade 1 for the last three years is a quarter of a cohort (about 2000 students) greater than would otherwise be expected.

  This is having, and will continue to have, consequential affects on class numbers in the lower primary grades and will 'bubble' through in future years. As time progresses the 'bubble' will dissipate partially as not all students continue directly from one grade to the next. The MoET will need to incorporate this 'bubble' of students into it's staff and resource planning.

- The proportion of students engaging in Junior Secondary education (Year 7 – 10) requires attention. It has barely changed in recent years and is well below the proportion expected. Every boys and girl should be continuing to at least the end of Year. The barriers to boys and girls continuing their education past Grade 6 need to be identified and addressed as a priority.

[5] See Annex 5 for the estimated population table by gender for each province for people aged 4 – 19 in 2019 based on the 2016 mini census data.

Task 2. Retention

Detail retention rates disaggregated by gender, province and school type.

Retention of students from one year into the next is one measure of the success of both an education system and of schools. “Direct retention” measures the movement of individual students from one year to the next.

Normal progress for a student through the school system has a student, when they are six years old, commencing in Grade 1 after possibly spending one or two years in ‘pre school’. They then progress through to Grade 8. Some students repeat a grade, meaning they finish Grade 8 later than their peers.

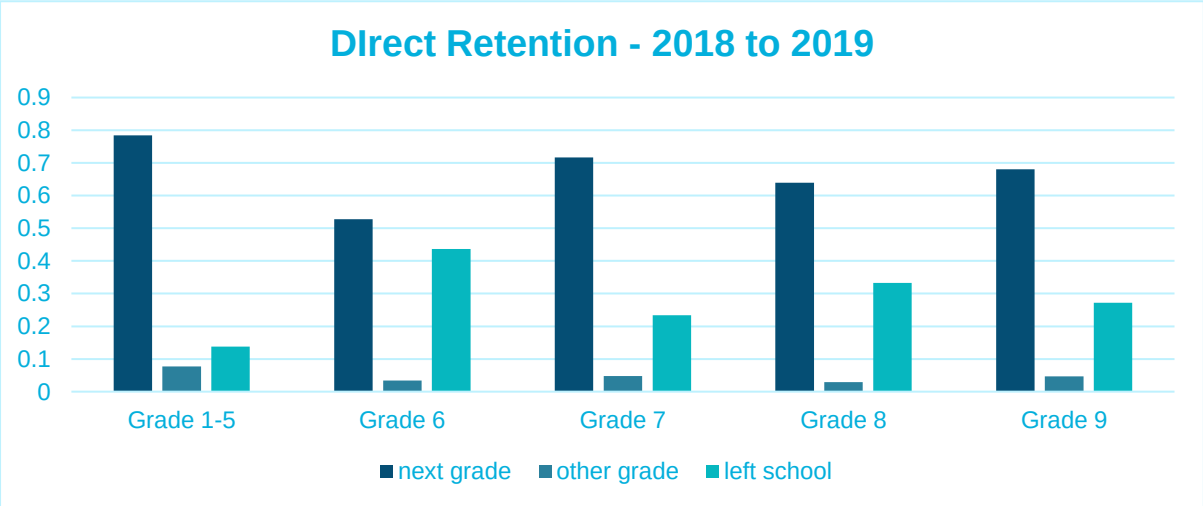
In Vanuatu, some schools offer programs up to Grade 6 and then students need to attend a new Grade 7-10 or 7-12 school. Many students continue to undertake Grade 9 and 10. Some then continue on to Grade 11, 12, 13 and 14.

2.1 School Types

Tracking students from one grade to the next reveals a multitude of paths that are followed. Students miss grades, repeat grades, change schools and provinces or leave school, either for a long time or for one or two years.

The graph below attempts to summarise the pattern of movement. An example path showing the grades of the 2019 Grade 6 students for the previous two years is provided at Annex 3. In that example only 69% of the Grade 6 students were in Grade 4 two years previously.

Graph 2.1 Proportion of students in 2018 who progressed to the correct next grade in 2019[6]



Source – Open VEMIS April 2020

[6] Detailed numbers and percentages for retention rates at province level are provided at Annex 5.

The above retention summary shows a number of concerning aspects.

- in Grades 1 – 5, nearly 14% of students appear to disengage from school, at least for one Grade.
- the rate of repeating is relatively high at nearly 7% of the Grade 1 – 5 students.
- in primary school, most student who remain in school stay at the same school.
- after Grade 6 only 56% of students appear to continue directly into Grade 7. About sixty percent of these continuing students have to change school as they have been attending a Grade 1 – 6 school.

2.2 Returning to school

At each grade level there is a proportion of students who join the grade without having been in school the previous year.

Some of these students had been in school before the previous year and have 'returned' after an absence of a year or more. Others arrive in the grade and are created as 'new' students as they do not appear to be in the *Open VEMIS* database.

Table 2.1 Number and percentage of students joining or re-joining grades for each grade from grade 2 to grade 10 in 2019

2019 Grade	Re-joined grade in 2019 after missing one or more grades		Joined grade with no previous record of schooling in Open VEMIS		Total number in grade in 2019	In school in 2018 but did not continue at school in 2019
	Number	Percentage of grade	Number	Percentage of grade		
Grade 2	219	2.0%	1328	12.3%	*10833*	1596
Grade 3	234	2.2%	1231	11.7%	*10484*	1331
Grade 4	171	2.0%	923	10.7%	8660	1262
Grade 5	144	1.9%	603	7.8%	7706	1065
Grade 6	127	1.8%	687	9.9%	6947	1132
Grade 7	1280	23.5%	376	6.9%	5452	2870
Grade 8	237	5.4%	403	9.2%	4366	1183
Grade 9	259	6.7%	635	16.4%	3861	1431
Grade 10	202	6.5%	324	10.5%	3095	935

Source – Open VEMIS April 2020

- Nearly a quarter of students in Grade 7 were not in any grade the year before, but had been at school previously. This is consistent with the observation in Graph 2.1 above that many students do not continue into Grade 7 directly from Grade 6.
- Around 6% of students re-join Grades 8 – 10 after at least one grade of absence.
- The proportion of students joining classes in 2019 for what appears to be the first time may include many of the same students who appear to have not continued in school (see Graph 2.1 above). The figures can not be explained by inward international migration further investigations are required

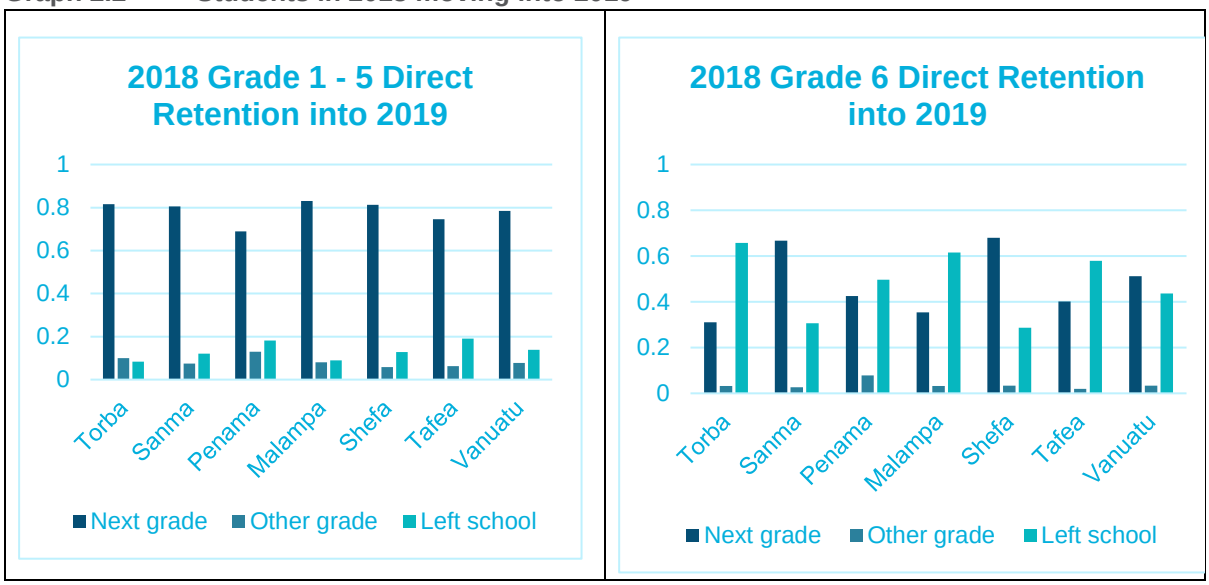
MoET needs to investigate the large number of new students in Grades 2 – 10 and either confirm they are indeed new students or develop processes to reduce duplication of students in *Open VEMIS*

2.3 Provinces

There is serious variation between the provinces when it comes to students continuing from Year 6 into Year 7

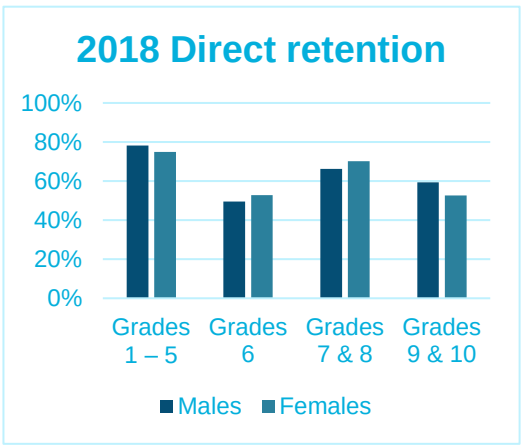
The graphs below, showing retention for Years 1 – 5 and Year 6, demonstrate the issue.

Graph 2.2 Students in 2018 moving into 2019[7]



Torba and Malampa both had more than 60% of their 2018 Grade 6 students failing to enrol in a Grade 7 class in 2019.

2.4 Gender



Graph 2.3 – Direct retention by gender

	Grades 1 – 5	Grades 6	Grades 7 & 8	Grades 9 & 10
Males	78.2%	49.5%	66.3%	59.3%
Females	75.0%	52.8%	70.1%	52.6%
Total	76.5%	51.1%	68.2%	56.0%

Table 2.2 – Proportion of boys and girls going from one grade in 2017 or 2018 to the next grade in 2018 or 2019

In grades 1 to 5, girls tend to 'drop out' more frequently than boys. From grades 6 – 8 it is the boys who are failing to continue. In grade 9 and 10 the girls return to leaving school more frequently than the boys.

[7] Detailed numbers and percentages for retention rates at province level are provided at Annex 5.

2.5 Discussion and Analysis

There is a high proportion of students not following the 'standard' pathway from one grade to the next in the following year..

For example, in Grades 1 – 5 nearly 14% of students appear to disengage from school, at least for one year and nearly 7% of students repeat a grade.;

In grades 1 to 5, girls tend to 'drop out' more frequently than boys. From grades 6 – 8 it is the boys who are failing to continue. In grade 9 and 10 the girls return to leaving school more frequently than the boys

Only 56% of Grade 6 students appear to continue directly into Grade 7. About sixty percent of those continuing students change school as they have been attending a Grade 1 – 6 school. Torba and Malampa both had more than 60% of their 2018 Grade 6 students failing to enrol in a Grade 7 class in 2019.

Nearly a quarter of students in Grade 7 were not in any grade the year before, but had been at school previously. Around 6% of students re-join Grades 8 – 10 after at least one grade of absence.

Primary and junior secondary students at English language schools continue to the next year at a significantly greater rate than those students at the French language schools.

2.5.1 Implications for the future

- Slightly less than half of Grade 6 students do not continue directly into Grade 7. This suggests many students are having trouble transitioning from their Year 6 school to their local Junior Secondary school for year 7.

  A quarter of the students enter Grade 7 after a break of one year or more, indicating that, having taken a break, many of the ex Year 6 students are finally ready for Grade 7. The Grade 6 to 7 transition is the point of the greatest loss of students. Whilst many eventually return to Grade 7, about a quarter do not.

  It is suggested the MoET initiate some qualitative research to identify the barriers, for boys and girls, to direct continuation from Grade 6 to 7, with a focus on those students who need to change schools.

- The proportion of students joining classes in 2019 for what appears to be the first time may include many of the same students who appear to have not continued in school from previous years. The number of "new" students can not be explained by inward international migration.

  It is suggested an audit of a sample of 'new' older students be undertaken; checking the database to see if they are indeed 'new' and, if they are, contacting the students to find out why they had not been in school. Depending on the results of the audit, enhanced protocols for creating 'new' students might be developed.

Task 3. School Grants

Detail the total value of school grants provided to all schools disaggregated by province and school type. Is there any evidence suggesting a correlation between school grants and the level of enrolment and retention disaggregated by province and school type?

3.1 Grants

Schools receive grants to support their discretional spending. The grant is usually paid in two instalments or 'tranches'. In 2019 each school received VT8900 per primary student and VT8150 per secondary student. The student enrolment figures are taken directly from the enrolment figures within *Open VEMIS*.

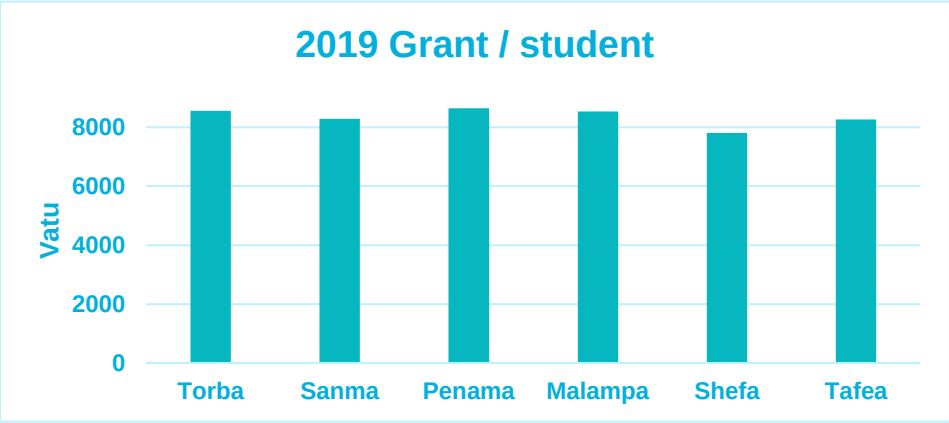
Table 3.1 Total value of school grants provided to all schools in 2019 (Vatu)

	Torba	Sanma	Penama	Malampa	Shefa	Tafea	Vanuatu
Primary (1 – 6)	13 839 500	72 506 950	52 224 725	72 766 400	75 152 100	91 995 325	378 485 000
Primary (1 – 8)	5 512 475	45 241 725	1 429 750	4 793 800	56 707 250	4 253 350	117 938 350
Secondary (7 – 10)	3 168 750	4 590 625	7 458 750	14 958 125	1 794 3625	7 523 750	55 643 625
Secondary (7 – 12)		129 43 125	1 681 875	2 583 750	6 199 375	5 078 125	28 486 250
Secondary (7 – 13)		10 570 625	3 932 500	3 144 375	20 629 375	5 045 625	43 322 500
Secondary (7 – 14)					6 841 250		6 841 250
TOTAL	22 520 725	145 853 050	66 727 600	98 246 450	183 472 975	113 896 175	630 716 975

Source Open VEMIS April 2020

3.2 Enrolments

There is a small variation in the average grant per student between the provinces, as can be seen from Graph 3.1 below. The variation can be attributed to the concentration of senior secondary places on Sanma and Shefa plus the non-payment of grants to a few schools that were non-compliant with reporting requirements.



Graph 3.1 2019 grants per student for each province

There is a clear linkage between school enrolment and grant funds received. Only in cases where past acquittals and reporting have been unsatisfactory are grants held back.

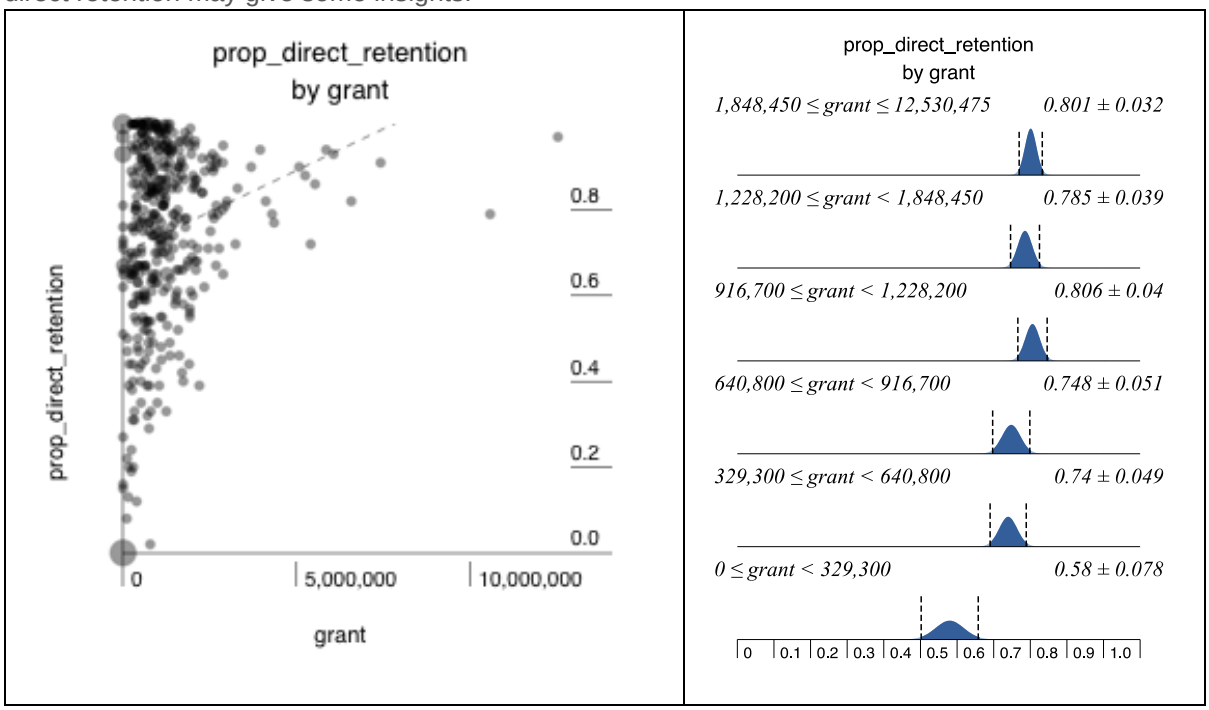
It is essential that enrolment figures in *Open VEMIS* are accurate. As grant funding is tied to enrolment, and enrolment is measured using *Open VEMIS* data, there is a perverse incentive for schools to 'maximise' or 'inflate' their enrolments. As a minimum, schools would be loathed to remove a student from their enrolment list until it was clear that a student was enrolled in another school.

Open VEMIS provides data quality tools to monitor the duplicate enrolment scenario. As an example, on May 22, 2020 there were around 900 students taking up 1850 enrolment records, some students were logged as being at 5 and 6 schools at the same time.

3.3 Retention

The amount of discretionary funding available to a school should influence the amount of consumable resources and the general quality of the school environment.

The proportion of primary school students in Grades 1 – 5 who continue in the next year to the next grade in the same school can be used as a measure of satisfaction with both the school and the education system. Examination of any relationship between the level of grant and this measure of direct retention may give some insights.



Graph 3.2 – Relationship between grants and direct retention in 2019 primary schools

Using a Pearson correlation analysis on the data pairs - direct retention proportion and the amount of the grant - for each school, and an analysis of variance (ANOVA) test on schools grouped by amounts of their grant, a clear trend emerges, with the probability of the patterns or differences observed being just due to random factors at less than 0.1%. These results are repeated for each province, suggesting it is a school level feature rather than provincial.

Improved direct retention appears to be related increased levels of grants.

3.4 Discussion and Analysis

There is a small variation in the average grant per student between the provinces. The variation can be attributed to the concentration of senior secondary places on Sanma and Shefa plus the non-payment of grants to a few schools that were non-compliant with reporting requirements.

As grant funding is tied to enrolment, and enrolment is measured using *Open VEMIS* data, there is a perverse incentive for schools to 'maximise' or 'inflate' their enrolments. Schools would, at least, be loathed to remove a student from their enrolment list until it was clear that a student was enrolled in another school and would not be returning. This behaviour is normal and seen world-wide unless well managed centrally.

3.4.1 Implications for the future

- For the current model of grant payments to schools to work it is essential that enrolment figures in *Open VEMIS* are and accurate and on-time.

  Open VEMIS provides data quality tools to monitor the duplicate enrolment scenario. As an example, on May 22, 2020 there were around 900 students taking up 1850 enrolment records, some students were logged as being at 5 and 6 schools at the same time.

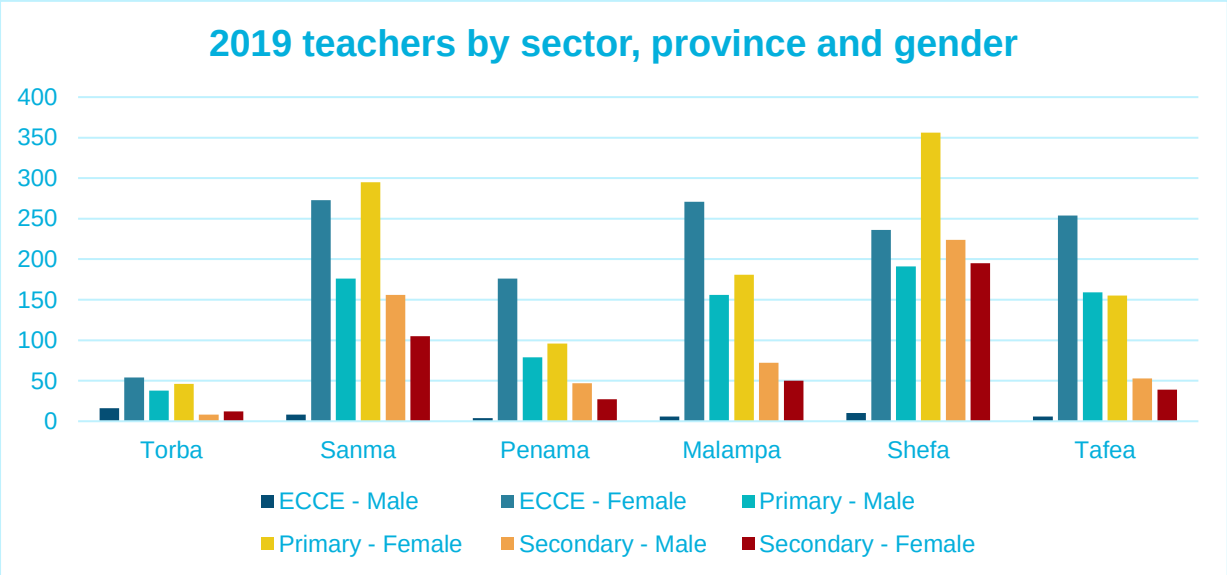
  It is suggested that MoET reviews the use of existing data quality tools, and develops new tools if necessary, to continually monitor data quality and enhance processes to ensure completeness, in particular the monitoring of new and changed enrolments. This may require the deployment of more staff dedicated to Open VEMIS data quality.

Task 4. Teachers

Number and gender of teachers by province and the correlation of teachers and enrolment and retention rates.

4.1 Teacher numbers

Teachers are appointed to schools in each province and sector. The number of appointments are based fundamentally on enrolments, predicated on ensuring schools have a minimum number of teachers to meet their needs.

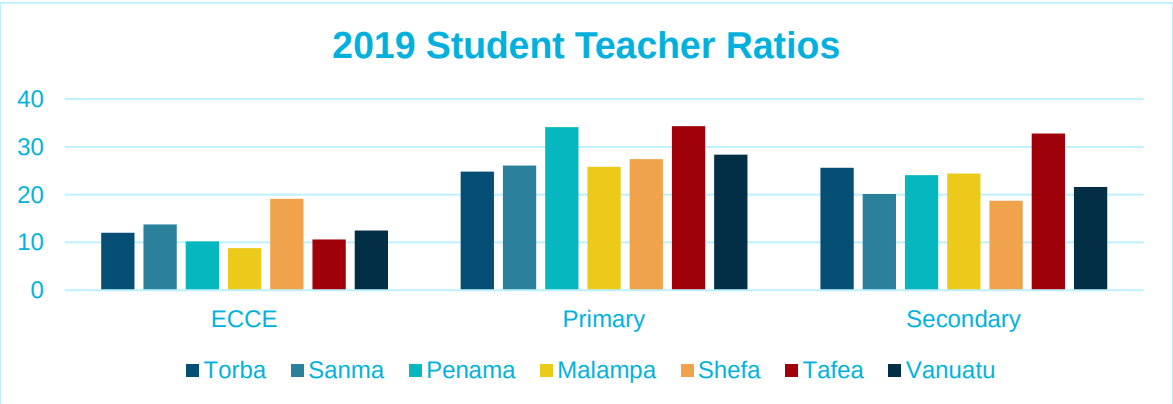


Graph 4.1 – 2019 Teachers - *Source MoET Statistics Report 2020 Table 26*

Women make up 96% of the early childhood teachers, 59% of the primary school teachers and 43% of secondary teachers.

4.2 Student Teacher Ratio

Student-Teacher Ratio (STR) is ratio of the number of students at the school or province divided by the number of teachers (including principals).



Graph 4.2 – 2019 Student teacher ratios - *Source MoET Statistics Report 2020 Table 29*

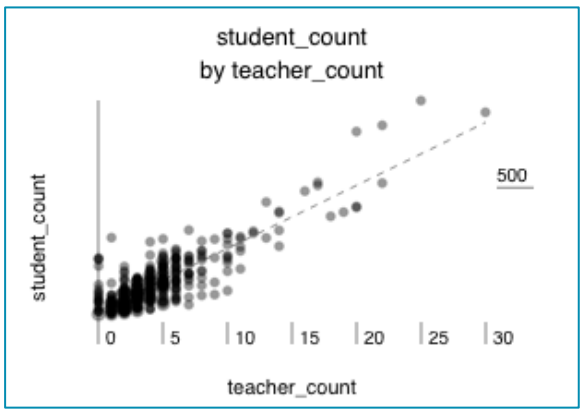
In ECCE, student teacher ratios are consistent across the six provinces except for Shefa were the ratio is much higher. In the primary sector the student teacher ratio in Penama and Tafea are well above the other four provinces. All provinces, apart from Torba, exceed the ratio of 25 students per teacher.

	2016	2017	2018	2019
ECCE	28.3	14.4	12	12.5
Primary	29	27.5	27.7	28.4
Secondary	24.2	19	20.4	21.6

Table 4.1 – Student teacher ratios 2016 - 29 - *Source MoET Statistics Report 2020 Table 29*

The ratios have been quite stable in the last three years, although there is a small upward trend.

Comparing the number of teachers at each primary school with their enrolment we see the following relationship :



There is a clear, and expected, relationship between the number of students at a school and the number of teachers.

The correlation coefficient (r^2) is 0.74, showing a strong relationship between the two aspects.

Some of the very largest schools appear to have fewer teachers that would be predicted from the overall data.

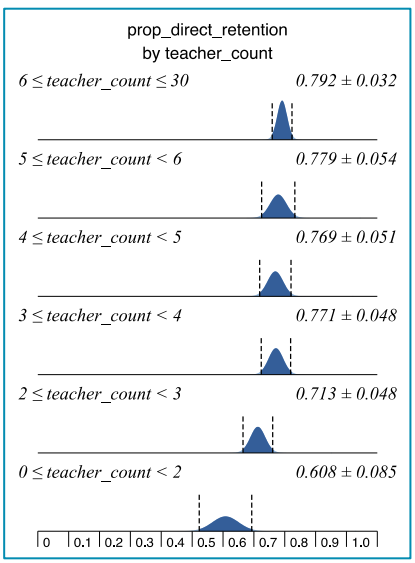
Graph 4.3 – Comparison of enrolment and teacher numbers - *Source Open VEMIS April 2020*

4.3 Retention

Direct retention of students from one grade to the next at the same school would appear to be associated with the number of teachers at a school.

Organising schools into 6 equal sized groups based on the number of teachers at the school and then comparing the means of proportion of students who continued directly from the previous grade in the same school in the previous year shows a tendency for the retention to improve as the number of teachers increases.

An analysis of variance (ANOVA) test on this set of means indicates the degree of difference seen between the means has a probability of less than 0.1 % if each of the six groups was randomly drawn from the underlying set of school data.



Graph 4.4 – relationship between retention and teacher numbers

4.4 Discussion and Analysis

Direct retention of students from one grade to the next at the same school would appear to be associated with the number of teachers at a school.

There is a clear, and expected, relationship between the number of students at a school and the number of teachers. Some of the very largest schools appear to have fewer teachers that would be predicted from the overall data.

In the primary sector the student teacher ratio in Penama and Tafea are well above the other four provinces with more than 30 students for each teacher. All provinces, apart from Torba, exceed the ratio of 25 students per teacher.

Task 5. Language used by schools

Language type used by schools by province and school type - correlated with the enrolment and retention rates

5.1 Language of schools

Once primary school commences, students are exposed to, and develop skills in either English or French, especially from Grade 3 onwards.

Table 5.1 - Number of schools by language

	French	English	Bilingual	Bislama	Vernacular	Total
ECCE	81	366	12	71	333	863
Primary	154	325				479
Secondary	34	77				111

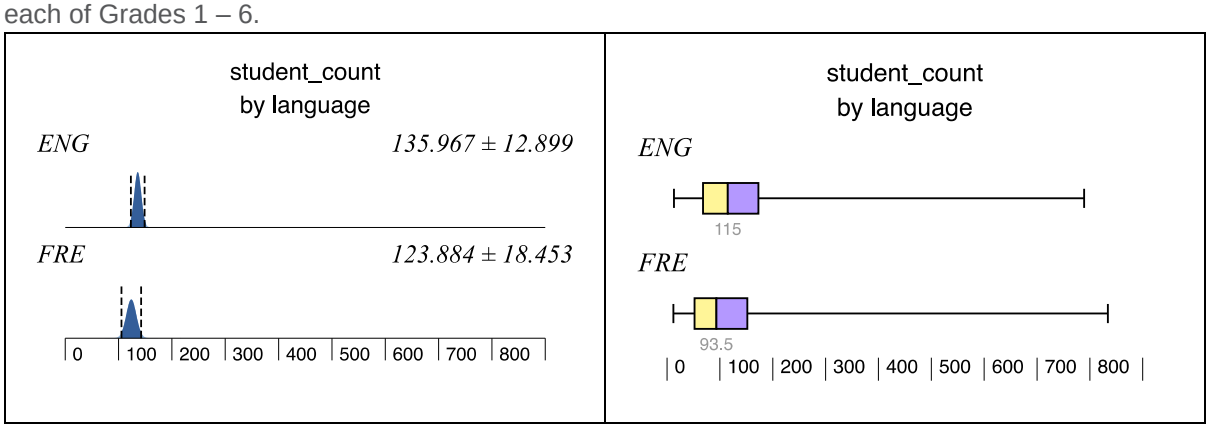
	Torba	Sanma	Penama	Malampa	Shefa	Tafea	Total
Primary - French	9	32	24	34	22	33	154
Primary - English	17	82	52	56	73	45	325
Secondary – French	2	4	4	9	8	7	34
Secondary - English	3	16	14	11	201	13	77

Table 5.2 - Number of primary and secondary schools by language in each province

5.2 Enrolment

5.2.1 Primary school enrolment

In primary schools of both languages, there is a wide range of enrolments. A few schools have 700 to 800 enrolments. The average enrolment size is around 130, which equates to around 22 students in each of Grades 1 – 6.



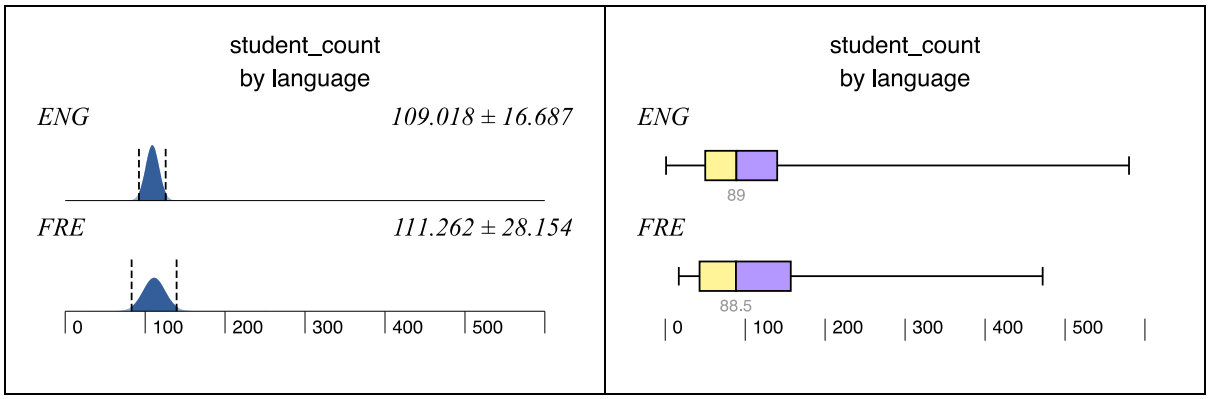
Graph 5.1 – Distribution of primary enrolment numbers by school language

A 't-test' analysis of the means of student numbers (enrolments) for primary schools shows the average enrolments in English (ENG) and French (FRE) language schools are not significantly different.

A 'box and whiskers' plot, however, shows that the median school size is quite different, with French language schools having a noticeably smaller median size yet having outliers that are bigger then any English language school. Using a Mann-Whitney rank correlation on the two sets of enrolment data we see that they are quite different with only 2.5% probability of the degree of difference or greater occurring randomly.

5.2.2 Junior Secondary enrolments

In junior secondary schools of both languages, there is a wide range of enrolments. A few schools have in excess of 500 student enrolments. The average enrolment size is around 110, which equates to around 30 students in each of Grades 7 – 10.



Graph 5.2 – Distribution of secondary enrolment numbers by school language

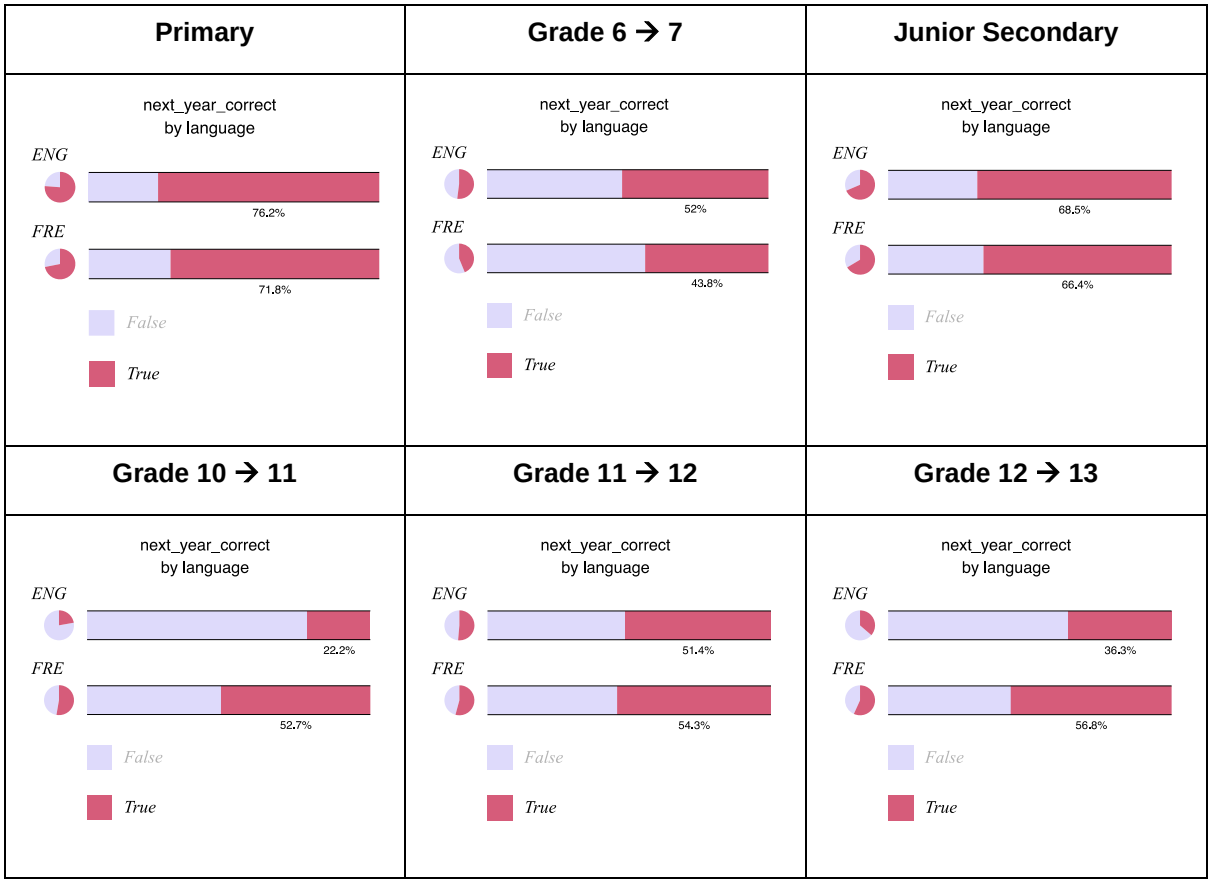
There is no significant difference between the distribution of enrolment numbers amongst schools of either language.

5.3 Retention

Students are expected to move from one grade to the next each year. Sometimes that involves changing schools. The proportion of students who do follow this 'standard' can be used as a measure of 'success' of a school and the whole system. Moving from one year to the next suggests students and their parents are comfortable with, and value, the education being provided by schools.

Using data from Open VEMIS we can link students from one year to the next and, for each year, record if they appear in the next grade in the next year. In the data set, this was recorded as 'next year correct' being 'true'.

The data can be broken into two groups, based on the language taught at the school. These groups can be analysed to see if the retention proportions are significantly different. The proportion for for different class groups follow -



Graph 5.3 – Direct retention proportions by school language

Performing a 'z-score' test on each of the sets of paired data reveals that the differences in proportions continuing to the correct next year is significant in all stages of schooling except for Grades 11 to 12. In primary and junior secondary students at English language schools continue to the next year at a significantly greater rate than those students at the French language schools

Students at French language schools continue at a higher rate into senior secondary (Grade 11). Senior secondary students in French language schools follow at single three year curriculum whereas the English language students transition to a different program in Grade 13. That may account for the major difference in continuation rates into Grade 13.

5.4 Discussion and Analysis

The language used by a school does not affect the levels of enrolment at schools.

Students in primary and junior secondary English language schools continue to the next year at a significantly greater rate than those students at the French language schools

The proportion of students who continue from Grade 6 to Grade 7, whilst significantly worse in French language schools, highlights the problems associated with students not continuing on directly from Grade 6.

Task 6. VANSTA results

Correlation between VANSTA results and enrolment and retention rates disaggregated by province and school type

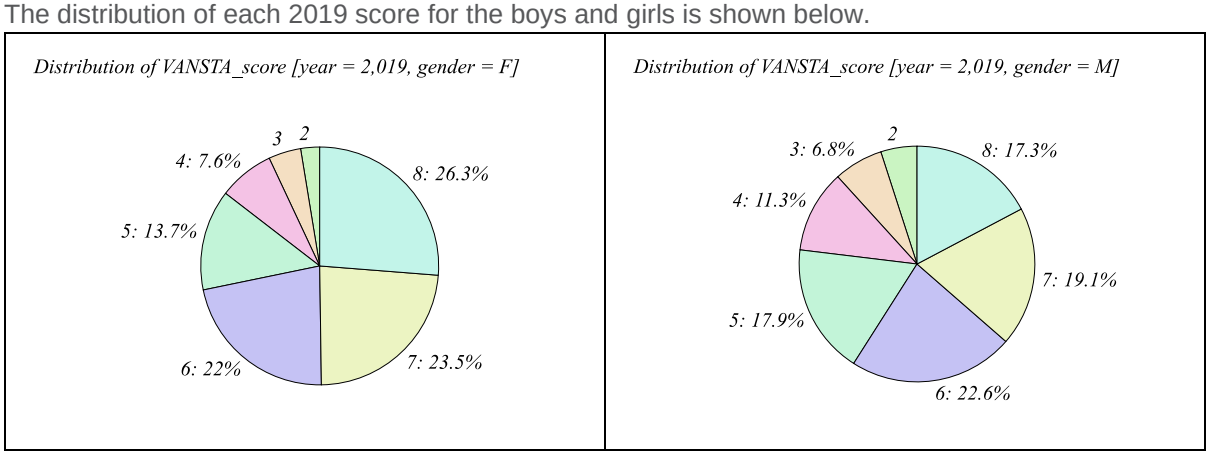
6.1 VANSTA results

Students in Grades 4, 6 and 8 participated in the VANSTA assessments in 2017 and 2019. Students undertook two tests, a literacy test and a numeracy test. In each test they were assessed as being either

1. Critically below minimum standard
2. Approaching minimum standard
3. Meeting minimum standard
4. Exceeding minimum standard

Each student who did both tests has a 'VANSTA score' calculated for them. The minimum score is 2 and the maximum is 8. The distribution of these scores can then be examined against other characteristics such as province of school, type of school (in Grade 8), gender of student, class and grade size and whether the student continued directly into the next year (for 2017 students only).

The distribution of each 2019 score for the boys and girls is shown below.



Graph 6.1 – Distribution of VANSTA scores by boys and girls

72% percent of the girls, compared to 59% of the boys, achieved a score of 6 or better. A chi-squared analysis of the different distributions is clear ($p<0.001$) that the differences in distributions are not random. The gender of a student is a contributing factor to student VANSTA scores.

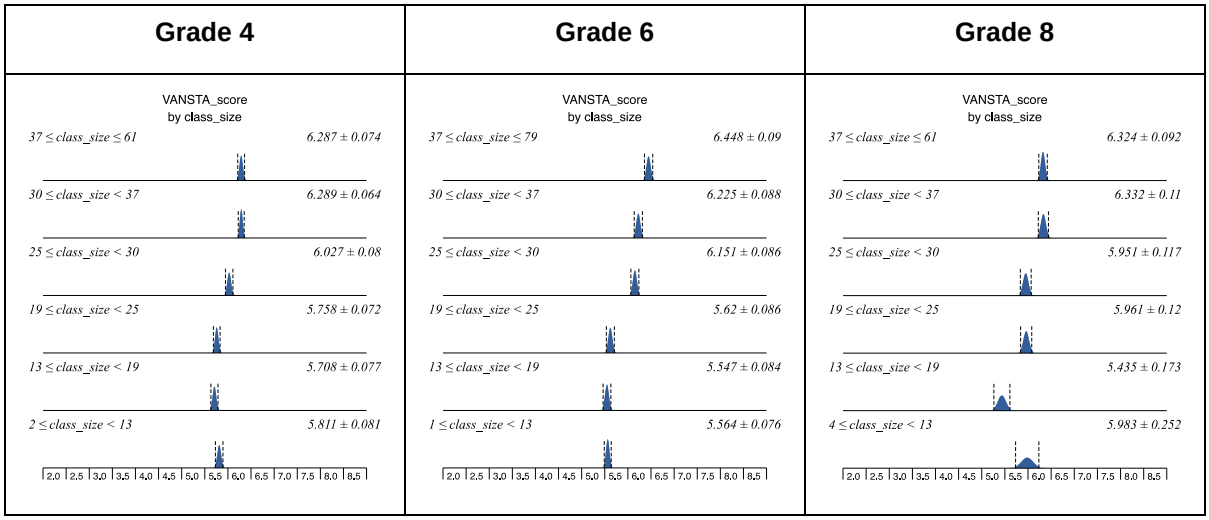
6.2 Enrolment rates

The size of a class and of a school may be contributing factors to VANSTA scores for boys and girls.

6.2.1 Class Size

Open VEMIS uses the concept of 'class' as a fundamental organiser. A 'class' is a collection of one or more students, a teacher, a grade level, a year and a school. This means we are able to estimate the number students in each person's class. This was done for every student who had a VANSTA-score.

The distribution of average class size for each VANSTA score for each of Grades 4, 6 & 8 follow.



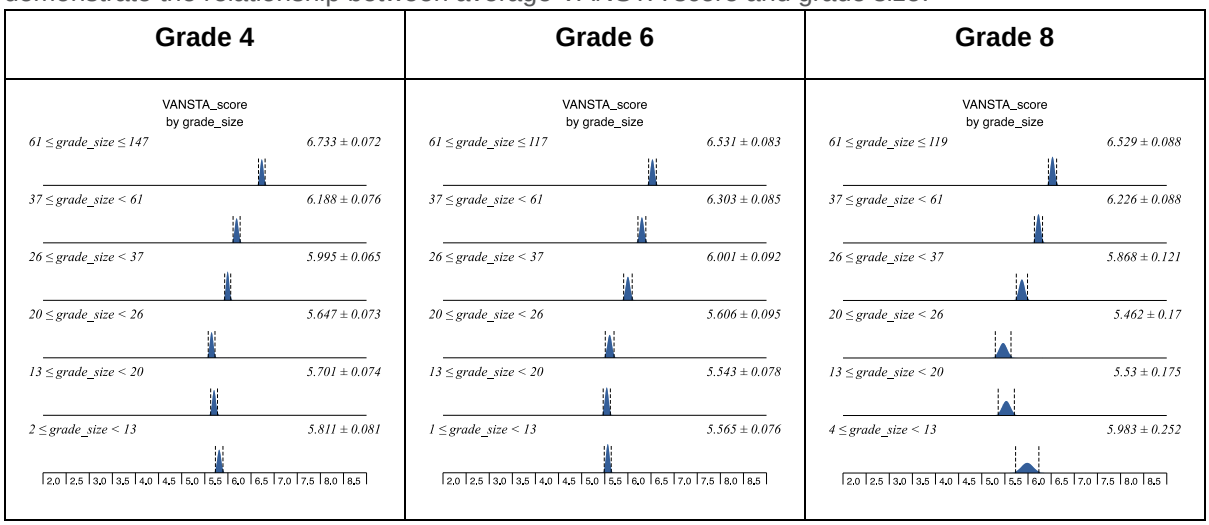
Graph 6.2 – Distribution of average VANSTA scores by class size and grade

In all three grades there is a clear pattern showing improved average VANSTA scores as the number of students in a class increases. Using ANOVA testing, this pattern is significant ($p<0.001$ of the distribution being random) in each of the three grades and for each gender.

The observation is contrary to the general held view that smaller classes produce better achievements. It should be noted, however, that the two smaller class categories could well include many 'composite' classes, where another 'class' is in the same room at the same time with the same teacher.

6.2.2 Grade Size

The size of a school, even with smaller classes, may affect performance. The following graphs demonstrate the relationship between average VANSTA score and grade size.

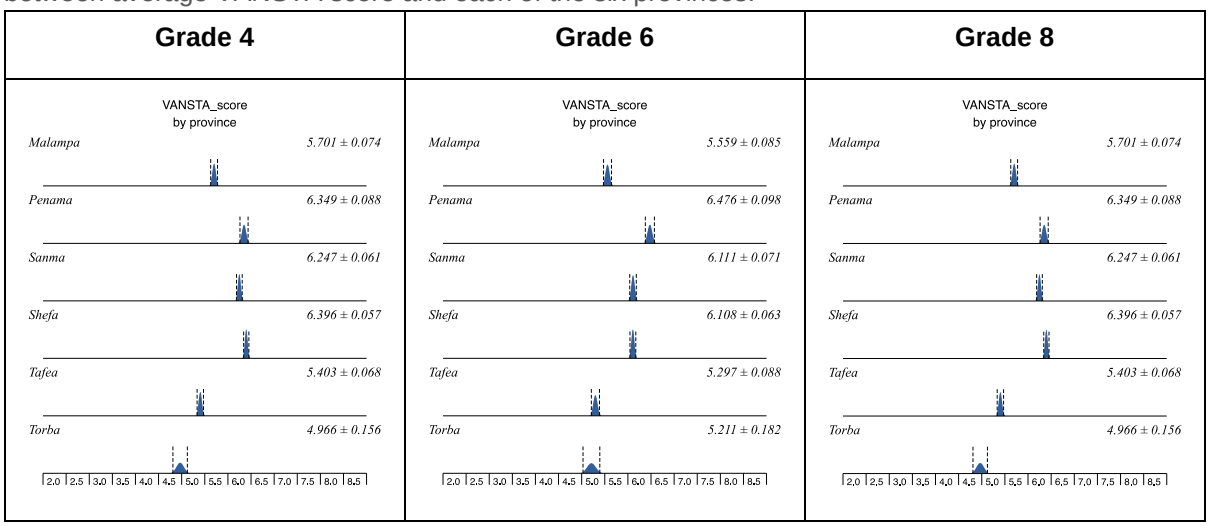


Graph 6.3 – Distribution of average VANSTA scores by grade size

In all three grades there is another clear pattern showing improved average VANSTA scores as the number of students in a grade increases. Using ANOVA testing, this pattern is significant ($p<0.001$ of the distribution being random) in each of the three grades and for each gender.

6.2.3 Province

The province of a school may affect performance. The following graphs demonstrate the relationship between average VANSTA score and each of the six provinces.



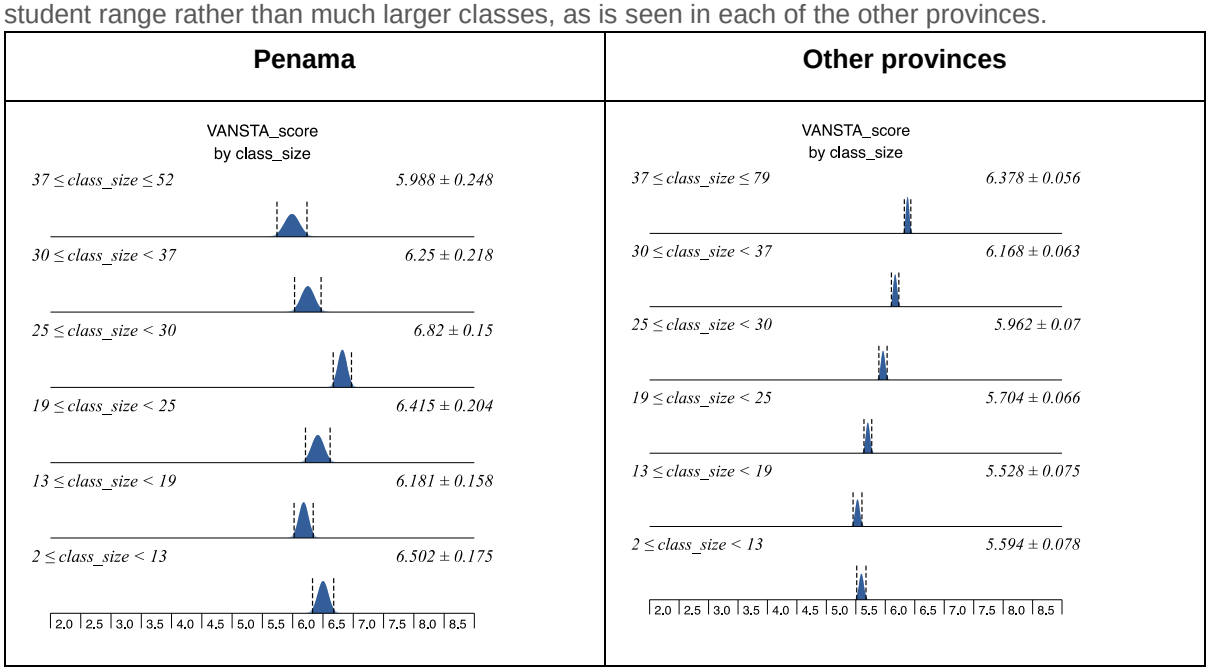
Graph 6.4 – Distribution of average VANSTA scores by province and grade

Penama, Sanma and Shefa stand out as the better performing provinces in all three grades.

In all three grades there is another clear pattern showing various average VANSTA scores for each province. Using ANOVA testing, this pattern is significant ($p<0.001$ of the distribution being random) in each of the three grades and for each gender.

Looking at each province, the significant relationship between grade size and average VANSTA score is seen in each province except Penama.

All provinces show a significant relationship between class size and average VANSTA performance. Penama stands out as having the highest average score associated with classes in the 25 – 30 student range rather than much larger classes, as is seen in each of the other provinces.

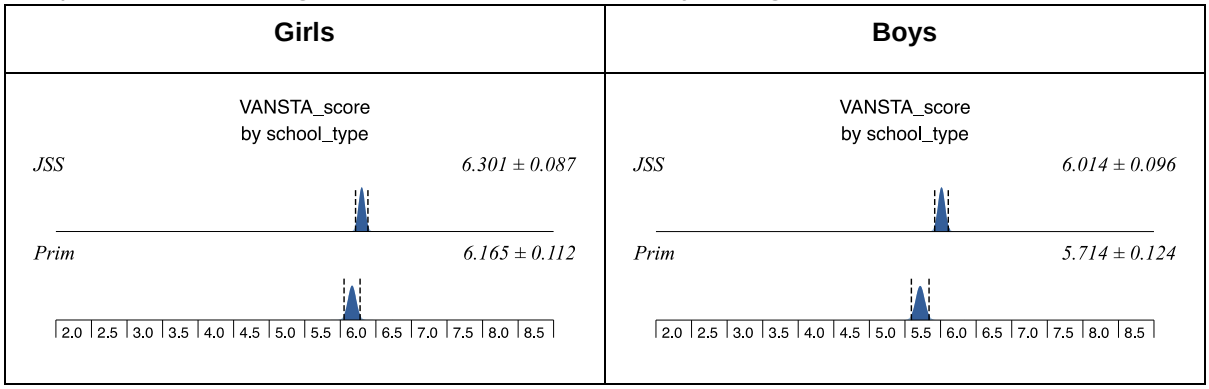


Graph 6.5 – Distribution of average 2017 VANSTA scores by class size in Penama and others

6.2.4 School Type

Some primary schools finish in Grade 6 and some go to grade 8. About half the students in grade 8 are is a school that is a 'primary' school and the other half of the grade 8 students are in a 'junior secondary' school that offers Grades 7 to 10.

Comparison of the average VANSTA score of Grade 8 boys and girls is below -

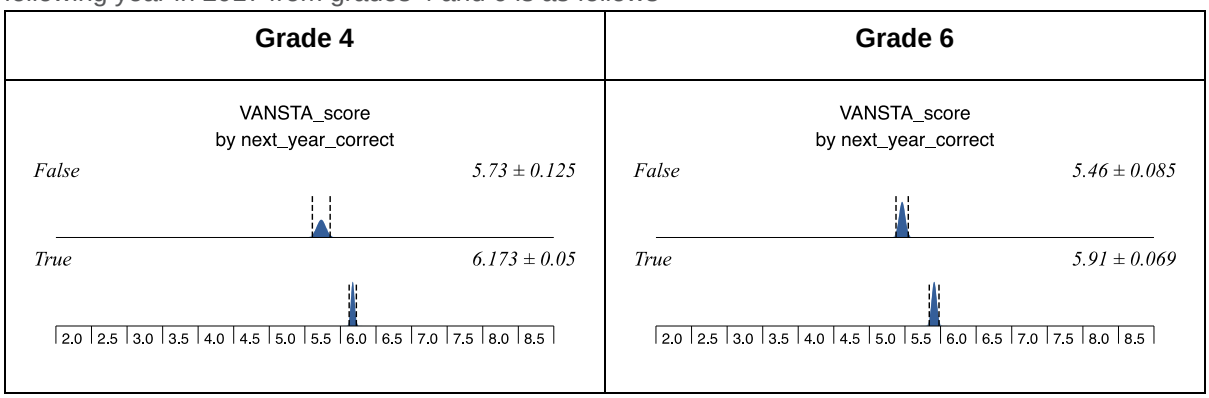


Graph 6.6 – Distribution of average Grade 8 VANSTA scores by school type and gender

A 't-test' analysis of each pair of VANSTA score means reveals that the difference in means is significant for the boys but not for the girls. This suggest that boys may well benefit more from the more 'mature' JSS environment.

6.3 Retention rates

As enrolment records for 2020 are still being updated, it is not possible to determine with accuracy which students continued on from 2019 into 2020. Accordingly, the 2017 transition into 2018 data is all that is available for analysis. The average VANSTA score of people who continued to the correct following year in 2017 from grades 4 and 6 is as follows –



Graph 6.7 – Distribution of average 2017 VANSTA scores by direct retention and grade

A 't-test' analysis of each pair of VANSTA score means reveals that the difference in means is significant ($p<0.001$) for both grades. This supports the argument that there is a relationship between student achievement levels and continuing with schooling.

In Grade 4 the pattern of significant difference is seen in every province except for Tafea. In Grade 6 it is significant except in Penama and Malampa.

6.4 Discussion and Analysis

There is a significant difference in the performance of boys and girls in the VANSTA tests. This variations is consistently seen across grades, years and provinces.

In all three grades there is clear pattern showing improved average VANSTA scores as the number of students in a grade increases.

There is also a clear pattern showing improved average VANSTA scores as the number of students in a class increases. This contrary to the general held view that smaller classes produce better achievements. It should be noted, however, that the two smaller class categories could well include many 'composite' classes, where another 'class' is in the same room at the same time with the same teacher.

There are significantly different average VANSTA scores for each province. A significant relationship between grade size and average VANSTA score is seen in each province except Penama.

Analysis suggest that grade 8 boys may well benefit more from the more 'mature' JSS environment.

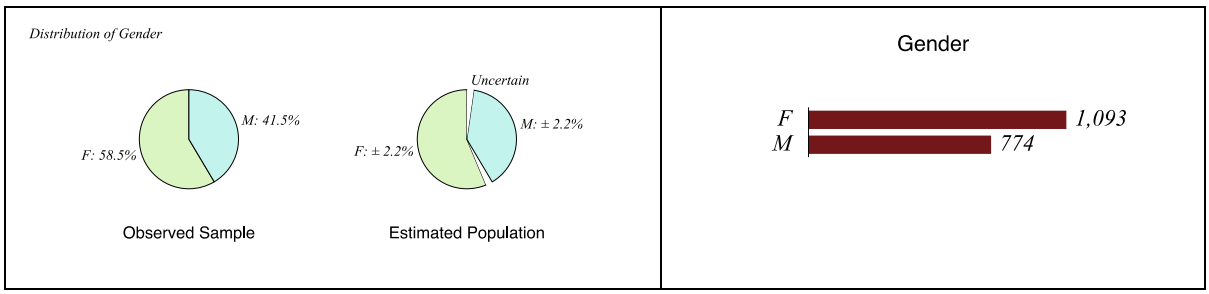
There is a significant difference in average VANSTA score for those students who continue directly to the next grade supporting the argument that there is a positive relationship between student achievement levels and continuing with schooling.

Task 7. Gender of teachers

Does the gender of teachers affect the schooling of boys and girls? If so, how?

7.1 Gender of Teachers

The gender of primary school teachers in 2019 is distributed as follows -



Graph 7.1 – Distribution of the gender of teachers

Nearly 60% of primary teachers are female

7.2 Schooling of boys and girls

Linking 2019 teacher and primary school data from Open VEMIS allows for an estimate of the proportion of female teachers, including principals, at each school. This data can be used to observe if there appears to be relationships between the proportion of female teachers and the schooling of primary school boys and girls

We have available VANSTA results in both literacy and numeracy are available for many students in 2019 in Grades 4 & 6.

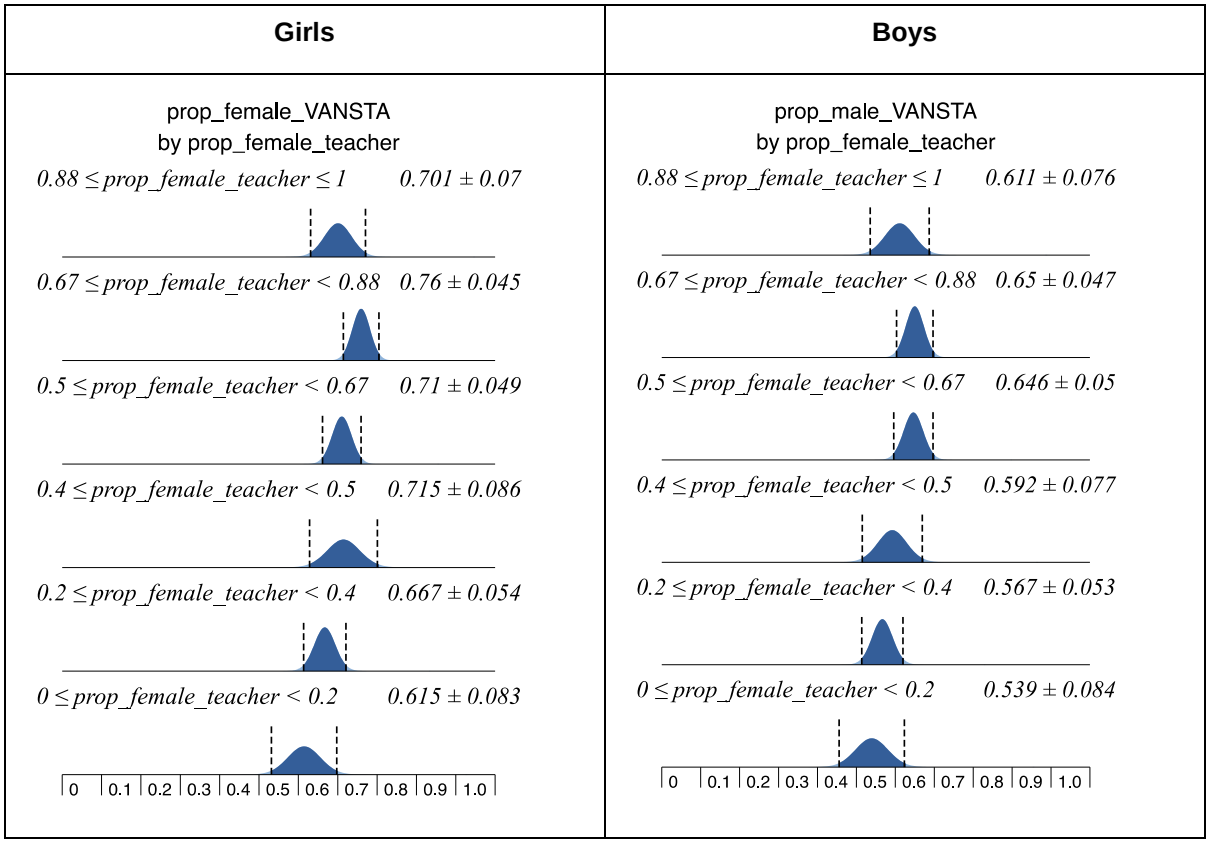
7.2.1 VANSTA achievements

Primary students in Grades 4 and 6 undertook the VANSTA assessments in 2019. Students undertook two tests, a literacy test and a numeracy test. In each test they were assessed as being either

1. Critically below minimum standard
2. Approaching minimum standard
3. Meeting minimum standard
4. Exceeding minimum standard

The proportion of boys and girls doing the tests who met the standards was determined for each primary school.

The average proportion of girls and boys, organised by the gender of their principal, is shown on the next chart.



Graph 7.2 – Distribution of proportion of students meeting the minimum VANSTA standards by gender of principal

Analysis of the variance (ANOVA) of differences of means for six equal sized groups of both the girls and the boys, organised by the proportion of female teachers at the school, indicate there is a significant difference (ie probability of no bias is less than 5%) between the proportion of girls meeting the minimum VANSTA standards and the proportion of female teachers.

The trend is not as strong for the boys and is not statistically significant.

7.3 Discussion and Analysis

As the proportion of female teachers improves, there is a tendency for the proportion of female students meeting the minimum VANSTA standards to improve. The analysis did not consider the gender of the teachers of Grades 4 & 6, rather of the whole school, so any conclusions drawn about the effect of teacher gender on achievement need to be treated very cautiously.

7.3.1 Implications for the future

- Enrolment records in *Open VEMIS* only include 2019 teacher details in 41% of the records. Analysis of gender (and age / experience) of teachers and student achievement requires the links between teacher and student to be known in the vast majority of cases. Having the links in most cases would enable teacher attributes to be associated directly with students, rather than through schools.

  It is suggested that schools be encouraged to link their teachers with their class enrolment data in Open VEMIS.

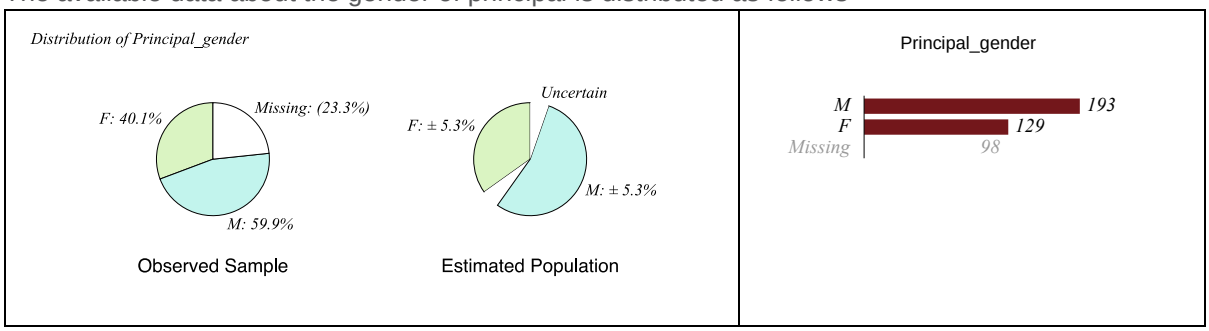
Task 8. Gender of principals

Does the gender of principals affect the schooling of boys and girls? If so, how?

8.1 Gender of Principals

Linking 2019 teacher and primary school data from Open VEMIS allowed for an estimate of the gender of principals in primary schools to be estimated. For some schools, no teacher was allocated the role of 'Principal'.

The available data about the gender of principal is distributed as follows -



Graph 8.1 – Distribution of the gender of school principals

With nearly 60% of the sample being male, we can say with confidence that a majority of primary school principals are male.

8.2 Schooling of boys and girls

We have the two measures of schooling available:

- VANSTA combined scores in both literacy and numeracy are available for many students in 2017 and 2019 in Grades 4, 6 & 8 (2019 only).
- Direct retention from one grade to the next at the same school.

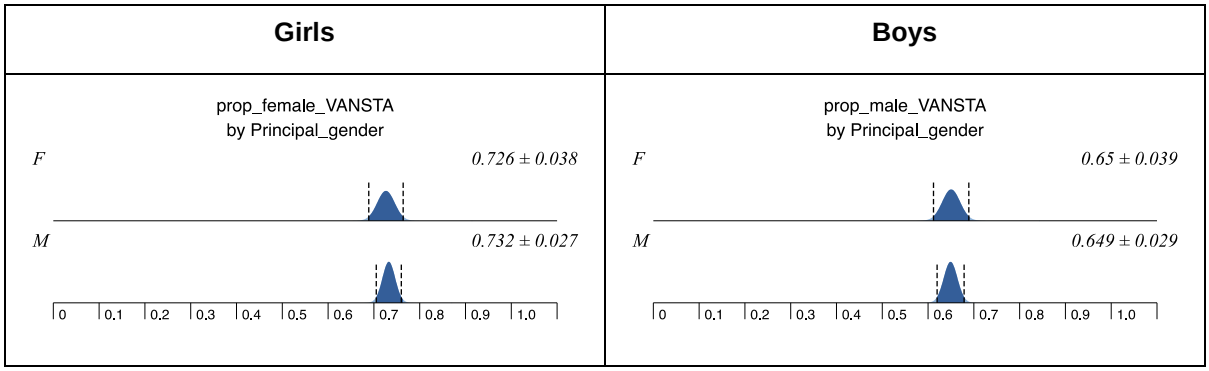
8.2.1 VANSTA achievements

Students in Grades 4 and 6 undertook the VANSTA assessments in 2017 and 2019. In 2019 the VANSTA program was extended to students in Grade 8. Students undertook two tests, a literacy test and a numeracy test. In each test they were assessed as being either

1. Critically below minimum standard
2. Approaching minimum standard
3. Meeting minimum standard
4. Exceeding minimum standard

The proportion of boys and girls doing the tests who met the standards was determined for each primary school.

The average proportion of girls and boys, organised by the gender of their principal, is shown o the next chart.



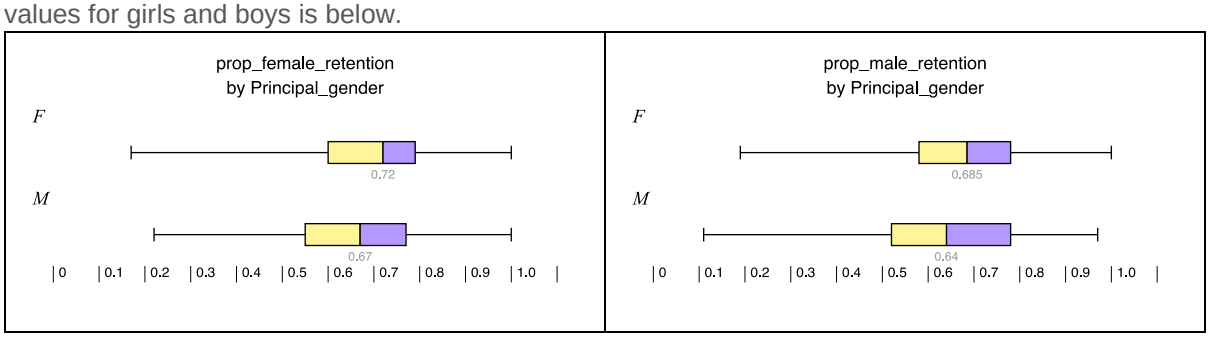
Graph 8.2 – Distribution of proportion of students meeting the minimum VANSTA standards by gender of principal

A 't-test' of differences of means for both the girls and the boys does not indicate there is any significant difference between the proportion of either gender meeting the minimum VANSTA standards when considering the gender of their principal.

8.2.2 Direct retention

Using data from Open VEMIS we can link students from one Grade to the next. The proportion of 2019 girls and boys in Grade 2 – 6 who moved directly from the previous grade in 2018 was calculated for each school. This can be then correlated with the gender of the school principal.

A 'box and whiskers' plot showing the minimum, maximum, upper and lower quartile and median values for girls and boys is below.



Graph 8.3 – Distribution of proportions of 2019 primary school girls and boys continuing from the previous grade in 2018 by gender of school principal

A 'Mann-Whitney' test of rank order for the girls indicates there is a significant difference between the proportion of girls continuing from one grade to the next when considering the gender of their principal. The probability of this level of difference in the two distributions is less than 2%. Any probability less than 5% can be considered significant. The difference in the rank orders for the boys was, however, not significant.

A 't-test' on the mean proportions of girls continuing from one grade to the next, when organised by the gender of their principal, was statistically inconclusive, with a 6.5% probability of observing the level of difference between the two groups.

8.3 Discussion and Analysis

The gender of their principal does not affect the achievements boys or girls.

Task 9. Location / Principal interactions

What are significant interactions between location (rural and urban) and principals' attributes (gender, level of education, age, experience, etc.) in determining the schooling of boys and girls?

9.1 Interactions between location and principals' attributes

The principals of many of the 2019 primary schools were obtained from Open VEMIS. Only gender and ages were available from the data available.

Information about Principal experience (aside from age) and levels of education was not available.

	Urban	Rural
% female principals	50%	40%
average age	39 years old	41 years old

Table 9.1– interactions between location and principal attributes

Neither the proportion of female principals nor their average age vary significantly between the rural and urban contexts.

Note: The analysis as a part of Task 12.2 looks at links between principal attributes and student achievements. Task 12.3 includes analysis of links between location and student achievement.

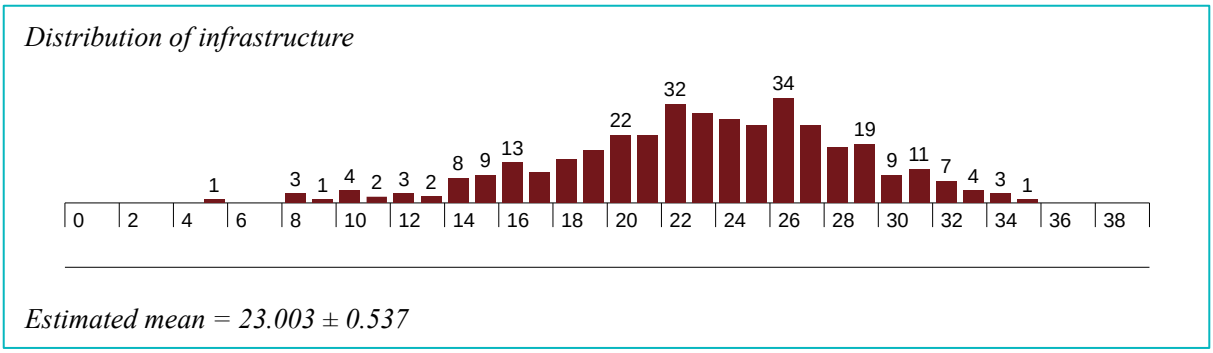
Task 10. Infrastructure

How does infrastructure (access to water, electricity, furniture, etc.) aspects of the schools correlate with the schooling of boys and girls?

10.1 Infrastructure

All but 45 primary schools have been assessed against a set of 37 infrastructure related questions during the last five Grades. The questions looked to see if a school has the minimum components of infrastructure, such as toilets, access to drinking water, playgrounds, security etc. Based on this data an 'infrastructure score' was developed for each school. Details of the factors contributing to the score are included at Annex XX.

The infrastructure scores are distributed as shown below



Graph 10.1 – Distribution of school infrastructure scores

10.2 Schooling of boys and girls

We have the two measures of schooling available:

- VANSTA combined scores in both literacy and numeracy are available for many students in 2017 and 2019 in Grades 4, 6 & 8 (2019 only).
- Direct retention from one grade to the next at the same school.

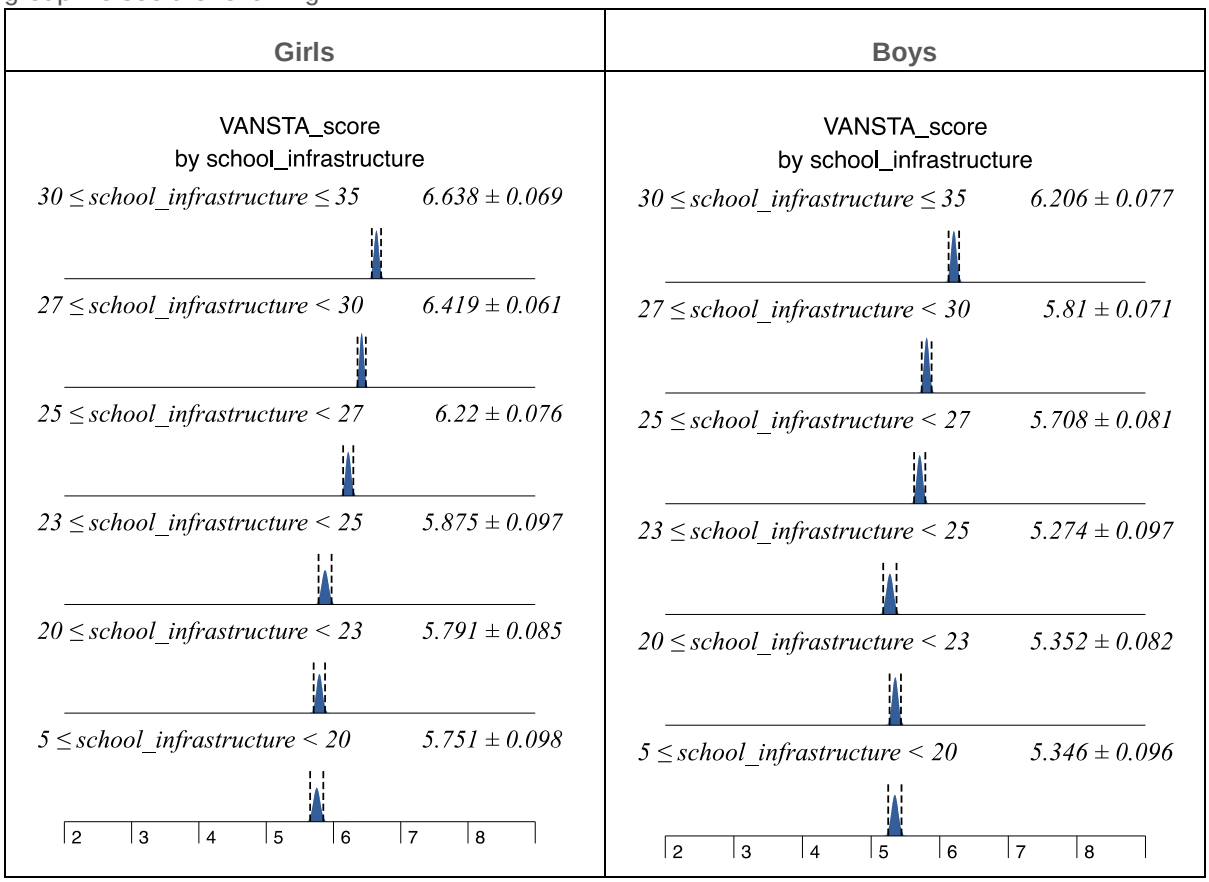
10.2.1 VANSTA achievements

Students in Grades 4 and 6 undertook the VANSTA assessments in 2017 and 2019. In 2019 the VANSTA program was extended to students in Grade 8. Students undertook two tests, a literacy test and a numeracy test. In each test they were assessed as being either

1. Critically below minimum standard
2. Approaching minimum standard
3. Meeting minimum standard
4. Exceeding minimum standard

Students who did the tests in 2017 and students who did the tests in 2019 had a 'VANSTA score' calculated by adding the achievement levels for both tests. For example, a students who was assessed as 'approaching the minimum standard' for both tests would have a score of 4.

We can examine the spread of the 'VANSTA score' among groups of girls and boys, separated by the infrastructure score of their schools. Looking at the mean VANSTA score for girls and boys in each group we see the following –



Graph 10.2 – Distribution of mean VANSTA scores by level of school infrastructure

Using an ANOVA test on the sets of means, the probability of the observed pattern for either boys or girls occurring randomly is less than 0.1%. There is a clear, positive, relationship between student VANSTA achievements and the level of infrastructure at their school. The infrastructure effect is similar for girls and boys.

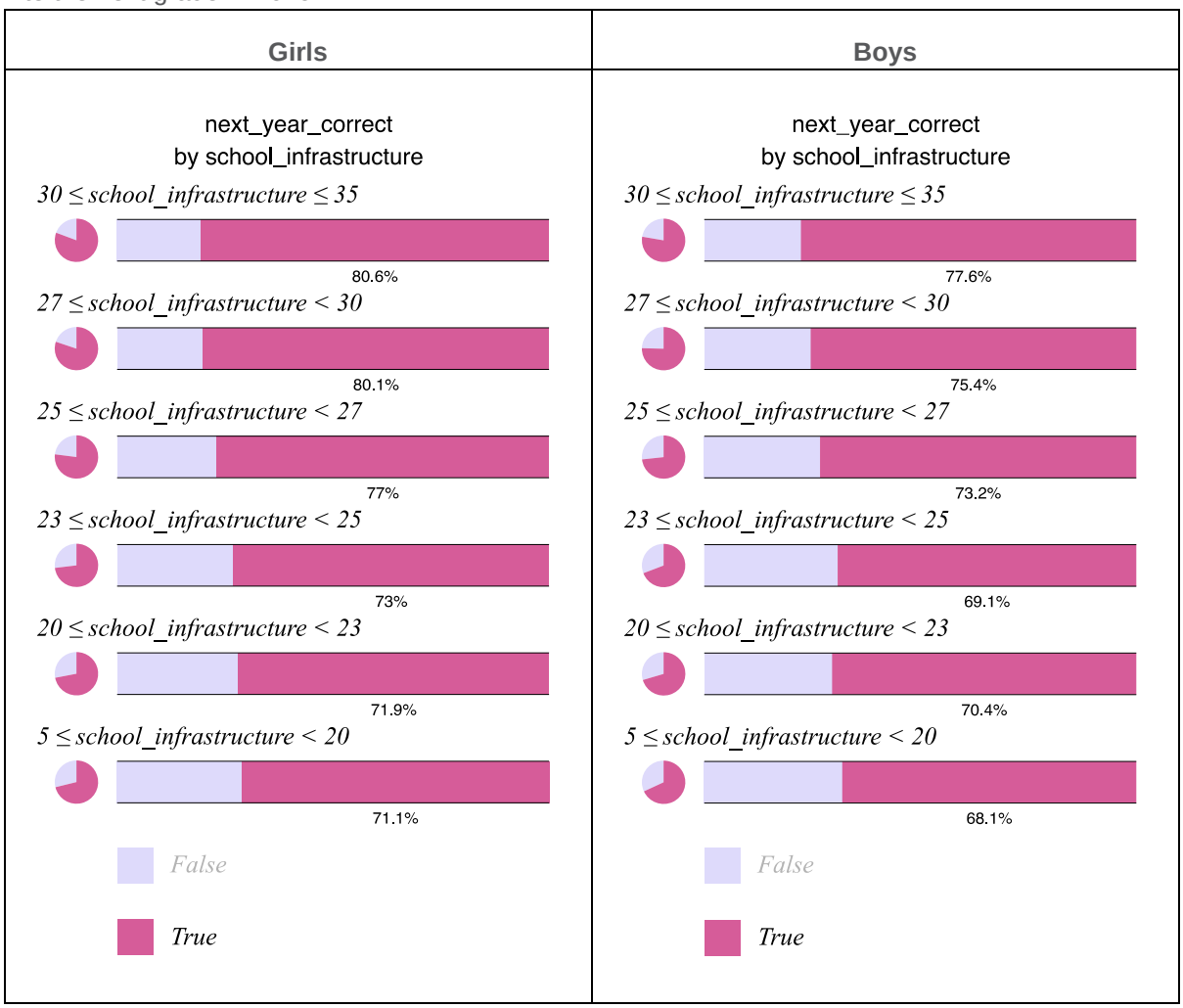
Regardless of the level of infrastructure of the school, girls are performing, on average, about 0.4 – 0.5 of a 'VANSTA score' better than the boys.

10.2.2 Direct retention from one grade to the next

Students are expected to move from one grade to the next each Grade. Sometimes that involves changing schools. The proportion of students who do follow this 'standard' can be used as a measure of 'success' of a school and the whole system. Moving from one Grade to the next suggests students and their parents are comfortable with, and value, the education being provided by schools.

Using data from Open VEMIS we can link students from one Grade to the next and, for each Grade, record if they appear in the next grade in the next Grade. In the data set, this was recorded as 'next Grade correct' being 'true'.

The analysis below shows the proportion of students progressing from Grades 1 – 12 in 2018 directly into the next grade in 2019.



Graph 10.3 – Distribution of proportion of 2018 students continuing to the next grade in the following Grade by level of school infrastructure

Using an Pearson correlation test on the sets of proportions, the probability of the observed pattern for either boys or girls occurring randomly is less than 0.1%. There is a clear, positive, relationship between the proportion of students in 2018 continuing to the next grade in 2019 and the level of infrastructure at their school. The infrastructure effect is similar for girls and boys.

Regardless of the level of infrastructure of the school, around 3 % more of the girls are continuing to the next Grade than the boys.

10.3 Discussion and Analysis

The level of infrastructure at a school has a clear effect on both achievement and retention of both girls and boys. The effects are similar for each gender. Improvement of school infrastructure is likely to contribute to improved retention and achievement of students at a school.

10.3.1 Implications for the future

- Improving the level of infrastructure at schools needs to become an on-going priority in school, MoET and DFAT planning.

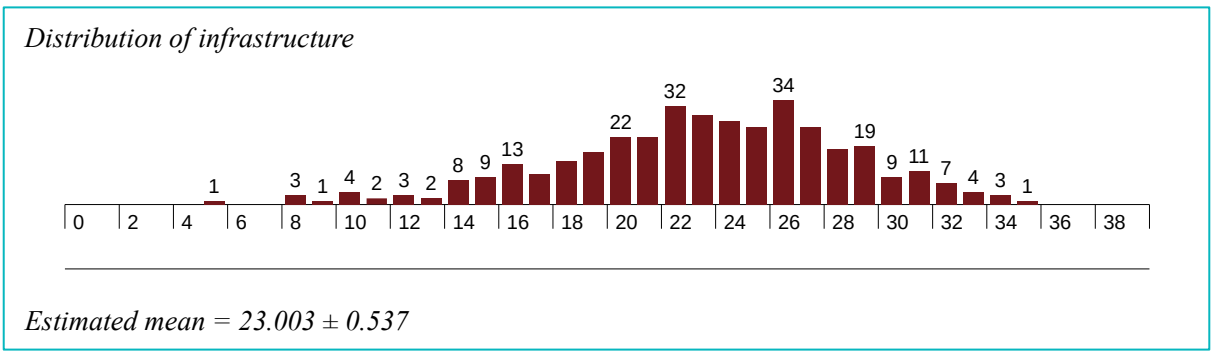
Task 11. Infrastructure and location

What are the correlations between infrastructure and geo-location ?

Infrastructure

All but 45 primary schools have been assessed against a set of 37 infrastructure related questions during the last five Grades. The questions looked to see if a school has the minimum components of infrastructure, such as toilets, access to drinking water, playgrounds, security etc. Based on this data an 'infrastructure score' was developed for each school. Details of the factors contributing to the score are included at Annex XX.

The infrastructure scores are distributed as shown below



Graph 11.1 – Distribution of school infrastructure scores

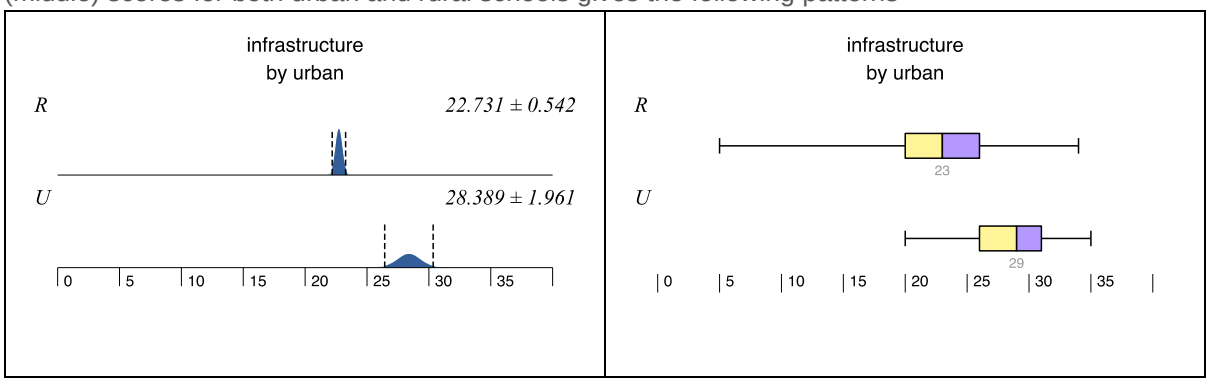
With an average infrastructure score of around 23 / 37 most schools still need support to bring their infrastructure up to the level that is desirable.

11.2 Geo-locations

Two types geographical classifications can be used for analysis – whether a school is 'urban' or 'rural' and which province the school is located within.

11.2.1 Urban / Rural

Twenty two primary schools located in Luganville and Port Vila are considered to be 'urban'. The remainder are 'rural. Comparisons of the mean (average) infrastructure scores and the median (middle) scores for both urban and rural schools gives the following patterns –



Graph 11.2 – Distribution of school infrastructure scores by urban / rural location

Both a 't-test' comparison of means and a Mann-Whitney ranking test predict that the data seen is likely to occur in less than 0.1% of cases if the two sets (urban and rural) were drawn from the population of schools randomly (ie. with no bias). Accordingly, we can say, with a high level of confidence, that being in the 'urban' group of schools makes a positive difference to a school's level of infra-structure.

This intuitively makes sense because schools in urban areas tend to be bigger, hence have more money available and are closer to resources hence can more easily improve their infrastructure.

11.2.3 Provinces

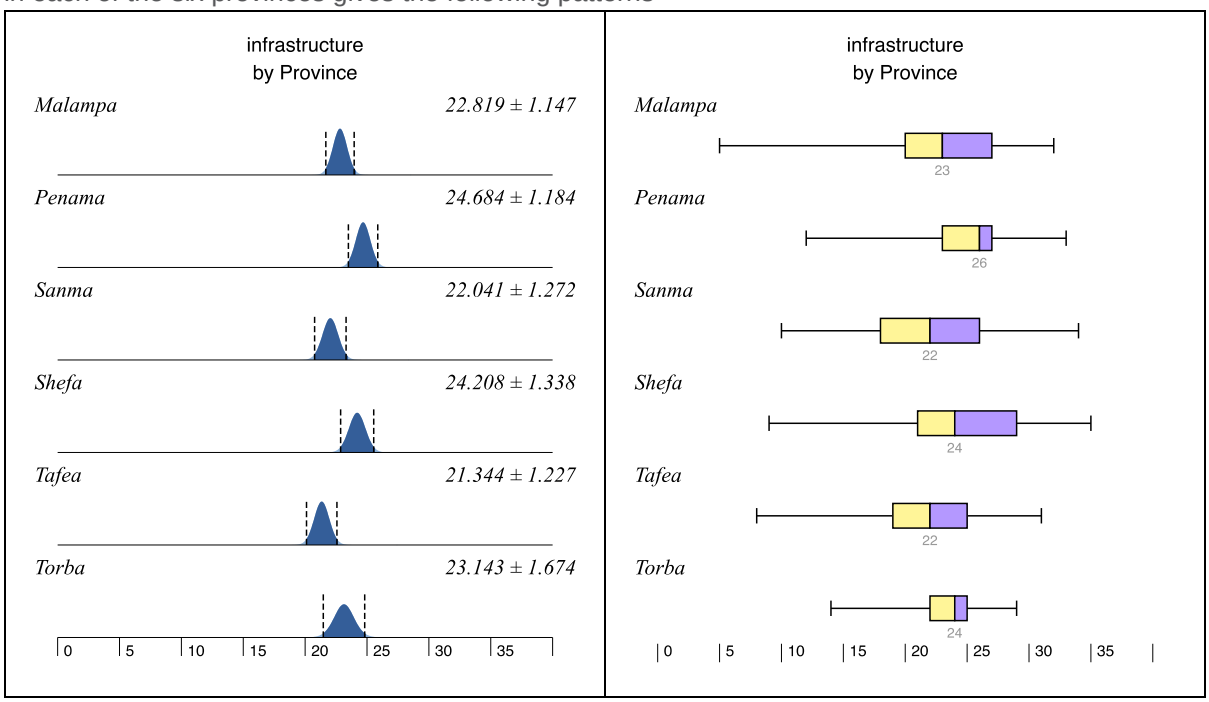
Differing numbers of primary schools are located in each province to support differing populations and numbers of towns and villages.

Table 11.1 Numbers of Primary schools

	Torba	Sanma	Penama	Malampa	Shefa	Tafea
Number of schools	26	114	76	90	95	78

Source: MoET Statistics Report 2020 - Table 22

Comparisons of the mean (average) infrastructure scores and the median (middle) scores for schools in each of the six provinces gives the following patterns –



Graph 11.3 Distribution of school infrastructure scores by province

There is a noticeably amount of variations between the mean (average) infrastructure score of schools in each province. The right hand 'box and whiskers' plot also shows that amount of variation ranges a lot. As an example, the range of the scores of schools in Torba is much more limited than the schools in Shefa, even though their median scores are similar.

Both an 'ANOVA' test of means and a Kruskai - Wallis ranking test predict that the data seen is likely to occur in less than 0.2% of cases if the six province sets were drawn from the population of schools randomly (ie. with no bias). Accordingly, we can say, with a high level of confidence, that the province of a school makes a difference to a school's level of infra-structure.

11.3 Discussion and Analysis

School location, both being in an urban or rural location and in a particular province, is a factor influencing the level of infrastructure at a school.

11.3.1 Implications for the future

- The school grant formula could be adjusted to take into account the extra costs associated with being a rural school.

  The use of the two-state 'urban' and 'rural' classification is very simple. Schools could be formally classified into four groups based on their access to urban centres such as 'urban', 'rural', 'remote' and 'very remote'.

  Having such as classification would support enhancement the funding formulae to help address the mis-balance in levels of infrastructure seen in schools across the country.

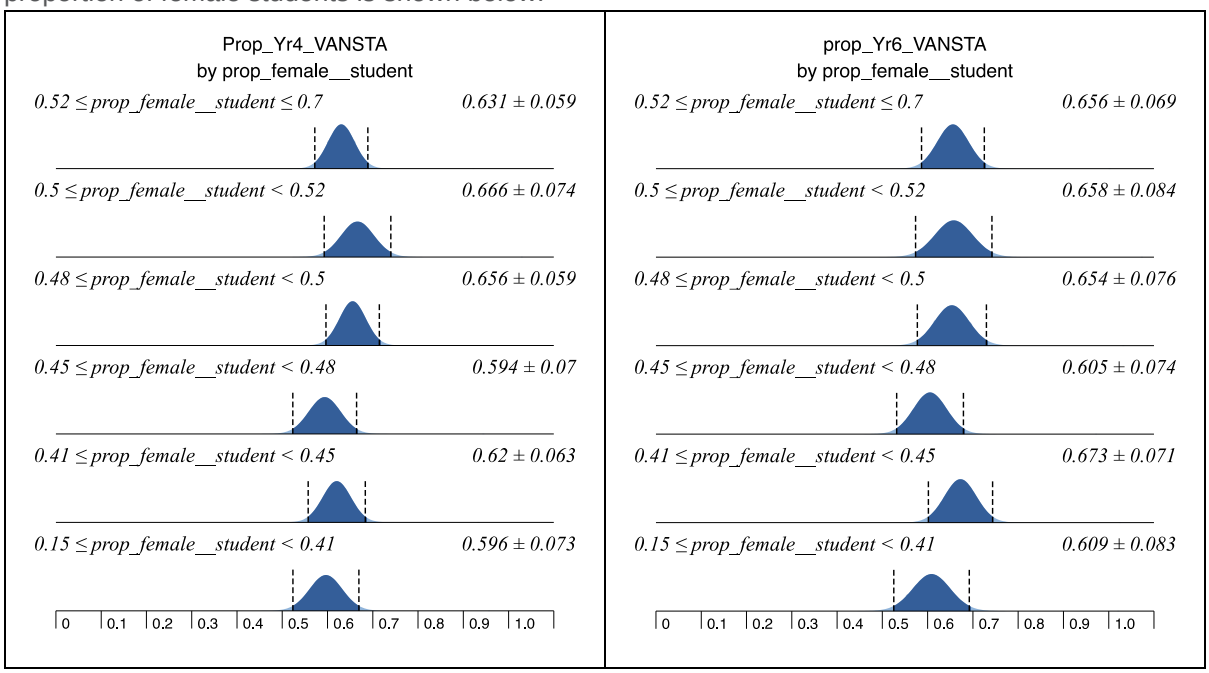
Task 12. VANSTA and schools

How boys' and girls' performance in the VANSTA correlate to gender variances in GPI, principals' attributes and other school level characteristics?

12.1 Gender variances in GPI

The Gender Parity Index (GPI) is measure of the proportion of girls enrolled, in comparison to the number of boys, adjusted for difference in the underlying population. A surrogate for GPI will be used as, at the school level, the underlying population is not known. The surrogate is the proportion of girls in the school's enrolment.

The proportion of students who meet the VANSTA minimum standards at a school, compared with the proportion of female students is shown below.



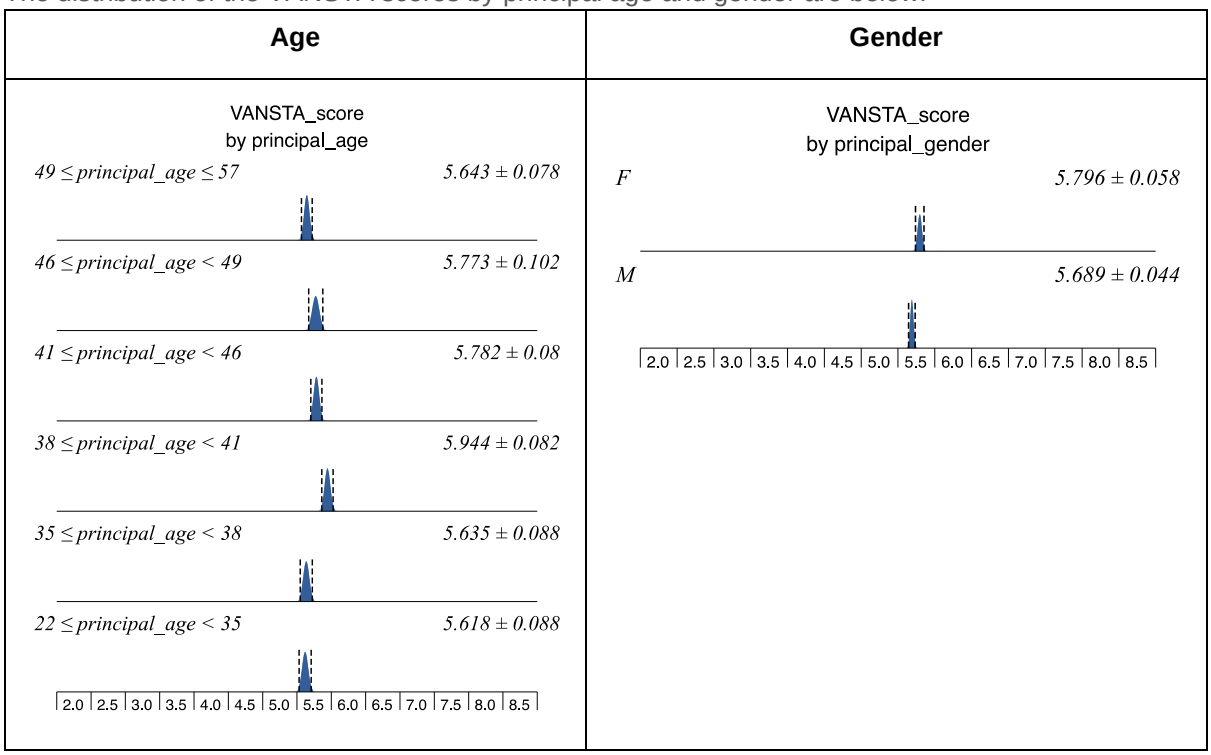
Graph 12.1 – Distribution of proportion of students meeting VANSTA minimum standards by proportion of female students

Analysis of variance (ANOVA) testing reveals there is probably no relationship between the proportion of students meeting the VANSTA minimum standards at a school and the proportion of female students at the school.

12.2 Principals' attributes

The principals of many of the 2019 primary schools were obtained from Open VEMIS. Only gender and ages were available from the data available. The age and gender was linked to the VANSTA score (combined result from both VANSTA tests) of the students in 2019 who did the tests (ie. most students in Grades 4, 6 & 8).

The distribution of the VANSTA scores by principal age and gender are below.



Graph 12.2 – Distribution of average VANSTA scores by Principal age and gender

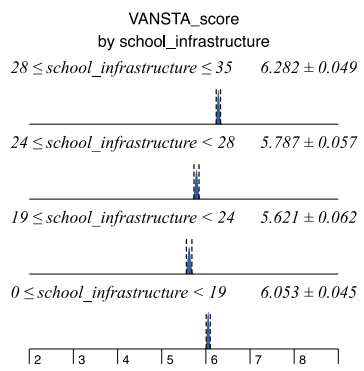
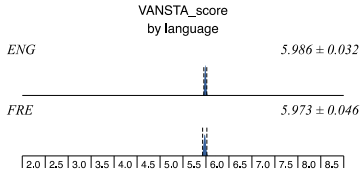
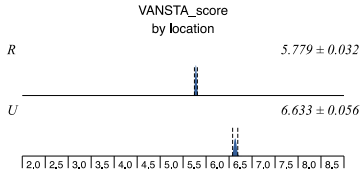
For both principal age and gender the differences are statistically significant. Principals in their forties have better average VANSTA scores. Students with female principals have better scores.

12.3 Other school level characteristics

Three further school level characteristics will be explored to see if there is a relationship with student VANSTA performance –

- infrastructure score
- language (French or English)
- location (urban or rural)

The relationship of the three school level characteristics with the VANSTA score of 2019 students are shown on the next page.

Infrastructure	language	Location
		

Graph 12.3 – Distribution of average VANSTA scores by infrastructure, language and location

Analysis of variance (ANOVA) testing on the relationship between a 2019 student's school infrastructure score and their VANSTA score reveals a relationship where the VANASTA score improves with the infrastructure score of the school.

There is not relationship between the VANSTA scores of students and the language (English or French) taught by their school.

Finally, there is a very strong relationship between the location of a student's school and their VANSTA score. Students at urban schools do much better than those at rural schools.

12.4 Discussion and Analysis

The proportion of female students at the school makes no difference to the proportion of students meeting the minimum VANSTA standards.

Principals in their forties have better average VANSTA scores. Students with female principals have better scores.

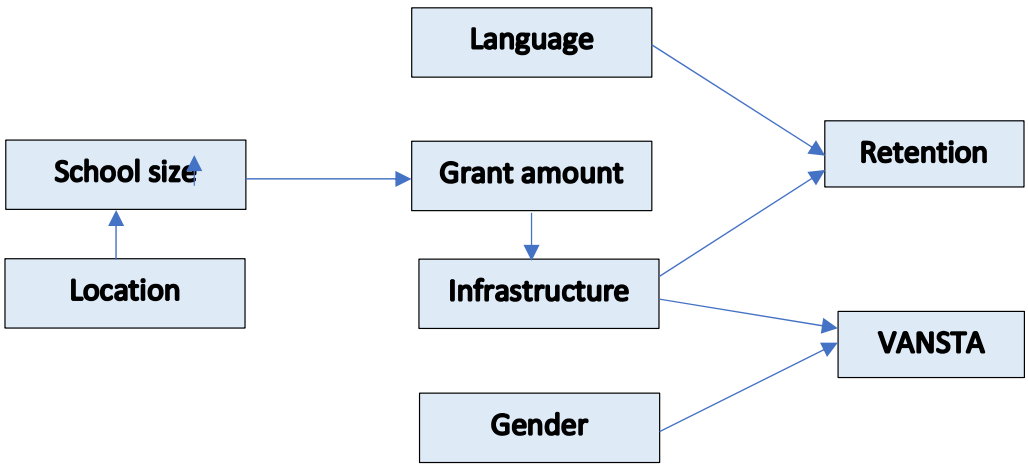
Student VANSTA scores improves with the infrastructure score of their schools. There is a very strong relationship between the location of a student's school and their VANSTA score. Students at urban schools do much better than those at rural schools.

There is no relationship between the VANSTA scores of students and the language (English or French) taught by their school.

Conclusions & Key Suggestions

Observed relationships

The following diagram illustrates, at a very high-level, a mapping of the major relationships between the various pieces of educational data analysed in this report.



The model above shows that addressing infrastructure issues is likely to have the greatest effect of the schooling of boys and girls,

The following suggestions are made to help take the analysis in this report further and actually contribute to the schooling of boys and girls in Vanuatu.

Infrastructure

1. Improving the level of infrastructure at schools needs to become an on-going priority in school, MoET and DFAT planning.

2. The school grant formula could be adjusted to take into account the extra costs associated with being a rural school. The use of the two-state 'urban' and 'rural' classification is very simple. Schools could be formally classified into four groups based on their access to urban centres such as 'urban', 'rural', 'remote' and 'very remote'.

   Having such as classification would then allow for the enhancement the funding formulae to help address the mis-balance in levels of infrastructure seen in schools across the country.

Enrolment

3. The number of students in grade 1 for the last three years is about 2000 students greater than would otherwise be expected. This is having, and will continue to have, consequential affects on class numbers in the lower primary grades and will 'bubble' through in future years. As time progresses the 'bubble' will dissipate partially as not all students continue directly from one grade to the next.

Stabilisation of the starting age average appears to have happened in 2020, so the Grade 1 class size is likely to revert to nearer 8000 students and grow in line with the population in future years.

The MoET will need to allow for the 'bubble' of students wen planning staffing and resources over the next decade.

4. The proportion of students engaging in Junior Secondary education (Year 7 – 10) requires attention. It has barely changed in recent years and is well below the proportion expected. Every boys and girl should be continuing to at least the end of Year. The barriers to boys and girls continuing their education past Grade 6 need to be identified and addressed as a priority.

Grade 6 into Grade 7 transition

5. Slightly less than half of Grade 6 students do not continue directly into Grade 7. This suggests many students are having trouble transitioning from their Year 6 school to their local Junior Secondary school for year 7. The proportion of students from French language schools is even greater at 56% not continuing directly.

   A quarter of the students enter Grade 7 after a break of one year or more, indicating that, having taken a break, many of the ex Year 6 students are finally ready for Grade 7. The Grade 6 to 7 transition is the point of the greatest loss of students. Whilst many eventually return to Grade 7, about a quarter do not.

   Some qualitative research needs to be undertaken to understand the barriers, for boys and girls, to direct continuation from Grade 6 to 7, A focus should be on those students who need to change schools.

Improving Open VEMIS

6. *Open VEMIS* provides data quality tools to monitor the duplicate enrolment scenario. As an example, on May 22, 2020 there were around 900 students taking up 1850 enrolment records, some students were logged as being at 5 and 6 schools at the same time.

   It is suggested that MoET reviews the use of existing data quality tools, and develops new tools if necessary, to continually monitor data quality and enhance processes to ensure completeness, in particular the monitoring of new and changed enrolments. This may require the deployment of more staff dedicated to Open VEMIS data quality.

7. Enrolment records in *Open VEMIS* only include 2019 teacher details in 41% of the records. Analysis of gender (and age / experience) of teachers and student achievement requires the links between teacher and student to be known in the vast majority of cases. Having the links in most cases would enable teacher attributes to be associated directly with students, rather than through schools.

   It is suggested that schools be encouraged to link their teachers with their class enrolment data in Open VEMIS.

8. It is suggested an audit of a sample of 'new' older students be undertaken; checking the database to see if they are indeed 'new' and, if they are, contacting the students to find out why they had not been in school. Depending on the results of the audit, enhanced protocols for creating 'new' students might be developed.

References

Documents

Vanuatu Standardised Tests of Achievement (VANSTA) 2019; *Vanuatu Ministry of Education and Training*, Port Vila, January 2020

Education Statistics - Basic Tables of 2019; *Vanuatu Ministry of Education and Training* , Port Vila, March 2020

Statistical Digest Report 2016 - 2018, *Vanuatu Ministry of Education*, Port Vila, 2019

2016 Post TC Pam Mini Census Report Volume 1, *Vanuatu National Statistics Office,* Port Vila, July 2017

Websites:

Millennium Development Goals https://www.un.org/millenniumgoals/

Country population projection estimates http://data.un.org/Search.aspx?q=Vanuatu

Country NER https://data.worldbank.org/indicator/SE.PRM.N National NER

2016 Mini Census province data (spreadsheet)
https://vnso.gov.vu/index.php/component/advlisting/?view=download&fileId=4548

Annex 1 – Definitions and Explanations

Primary Net Enrolment Ratio (NER)

The net enrolment ratio (NER) in primary education is one of the 'official indicators' for the Millennium Development Goal of universal primary education. The primary NER is the share of children of primary school age that are enrolled in primary school.

$$\text{Primary NER} = \frac{\text{Number of children of primary school age enrolled in primary school}}{\text{Number of children of primary school age}}$$

If all children of primary school age are enrolled in primary school, the primary NER is 100 percent. A primary NER below 100 percent means that not all children of primary school age are in primary school; some may be out of school, some may be in preschool, in secondary school or in other forms of education. By definition, the NER cannot exceed 100 percent.

Ideally, all children in a country enter primary school at the official primary school entrance age and leave from the final primary grade after the official duration of primary school, for example after six Grades. In this case, the primary NER would be 100 percent and universal primary education would be achieved.

Gross Enrolment Ratio (GER)

The gross enrolment ratio (GER) is a related indicator. The primary GER indicates how many children, regardless of their age, are enrolled in primary school, relative to the population of primary school age.

$$\text{Primary GER} = \frac{\text{Number of children enrolled in primary school}}{\text{Number of children of primary school age}}$$

The value of the GER can exceed 100 percent. Values above 100 percent mean that some children above or below primary school age are in primary school. A GER above 100 percent is usually an indicator of overage enrolment, for example due to repetition or late entry.

Gender Parity Index (GPI)

Gender Parity Index is the ration of the GER for girls divided by the GER for boys.

$$\text{GPI} = \frac{\text{GER (females)}}{\text{GER (males)}}$$

Statistical Tests

Test	Brief description of focus and purpose
t-test	A t-test is used to determine if there is a significant difference between the means of two groups. It is mostly used when the data sets would follow a normal distribution and may have unknown variances.
chi-square	Chi square is used when we have two categorical variables and want to determine if one variable is related to another.
ANOVA	Analysis of variance (ANOVA) is a technique that is used to check if the means of two or more groups are significantly different from each other. ANOVA checks the impact of one or more factors by comparing the means of different samples.
Pearson Correlation	Pearson's correlation coefficient measures the statistical relationship, or association, between two continuous variables.
Rank Correlation	A rank correlation coefficient measures the degree of similarity between two rankings, and can be used to assess the significance of the relation between them
Kolmogrov-Smirnov	The Kolmogorov-Smirnov test is a hypothesis test procedure for determining if two samples of data are from the same distribution. The test is non-parametric and entirely agnostic to what the distribution actually is.
Kruskai-Wallis	The Kruskal Wallis test uses ranks instead of actual data. The test is the non parametric alternative to the One Way ANOVA. 'Non parametric' means that the test doesn't assume your data comes from a particular distribution.
Mann-Whitney	The Mann-Whitney test is used to compare differences between two independent groups when the dependent variable is either ordinal or continuous, but not normally distributed

The null hypothesis

A **null hypothesis** is a hypothesis that says there is no statistically significant relationship between two variables. It is usually the hypothesis a researcher or experimenter will try to disprove or discredit.

If the null hypothesis can not be shown to be likely to be true, then the alternative hypothesis that there is a relationship may be true.

Generally, the probability of the observed data occurring has to be less than 5% ($p<0.05$) for the null hypothesis to be rejected.

Annex 2 – Data

Data Sources

Data for this analysis was sourced from the Open VEMIS data set. Open VEMIS is the relational database developed by the MOET to maintain records and linkages about students, schools and teachers.

It is a centrally managed database, accessible over the internet using a standard browser such as Explorer, Chrome or Safari. Schools with reliable internet access are expected to maintain their own records, others are supported by provincial education offices.

Most of the data was extracted, using standard reports available to MOET administrative users, on April 6, 2020. Some other data relating to grants and infrastructure was extracted later in the month.

Additional achievement data, from the VANSTA tests in 2019, was obtained from data held by the EAU. Most, but not all, student achievements are linked to student records in Open VEMIS.

Data Frames

Data frames were developed to support statistical analysis. Wizard v1.9.37[8], a statistical analysis package for OSX, was used to analyse the data frames and provided many of the the graphical reports included in the report.

A **2019 primary school data** frame was developed, using data either directly sourced or derived from *Open VEMIS* and VANSTA data. It contains the following information –

Data element	**Notes**
School OV Code	
School OV Name	
Province name	
Student count	Sum of students in Grades 1 – 6
Average grade count	Student count / 6
Principal gender	M or F
Proportion of female teachers	
Proportion of female students	a proxy for GPI
Average teacher age	Ignore invalid birthdates
Proportion Grade 4 VANSTA achieving	Based on number of students at school actually tested in VANSTA 2019
Proportion Grade 6 VANSTA achieving	Based on number of students at school actually tested in VANSTA 2019
proportion of direct retention	In the grade below at the same school in 2018 (Grades 2 – 6)
language of school	ENG or FRE
location (urban/rural)	Urban = Port Vila or Luganville
grant	Total grant amount (Vatu) allocated in 2019
infrastructure score	Based on survey done 2015-2017. An integer between 0 and 37

[8] Details about the software, including downloads, is available from https://www.wizardmac.com/

A small **2019 Junior Secondary chool data** frame was developed, using data either directly sourced or derived from *Open VEMIS* and VANSTA data. It contains the following information –

Data element	Notes
School OV Code	
School OV Name	
Province name	
Student count	Sum of students in Grades 7 – 10
language of school	ENG or FRE

A student / year data frame for enrolments from 2015 to 2020 was developed, using data either directly sourced or derived from *Open VEMIS* and from the VANSTA data. It contains the following information –

Data element	Notes
Age at Jan 01	Integer
Grade	2015 - 2020
Gender	M / F
Province name	
Grade	P,1,2,3,4,5,6,7,8,9,10,11,12,13,14,VOC
next Grade in same school	true / false
next Grade in same province	true / false
next Grade repeated class	true / false
next Grade in correct class	true / false
next Grade in another grade	true / false
next Grade missing	true / false
VANSTA score	For students who did two tests only. Combined score with a max of 8. A score of 6 is equivalent to meeting the expected standard in both literacy and numeracy tests.
school infrastructure score	Assume stable for full period 2015 – 2020. Only available for most primary schools.
Principal_age	
Principal_gender	M / F
location (urban / rural)	U / R
grade_size	
school_type	Prim / JSS

Data Quality

There were a number of issues found with the student data. In a few cases (approx. 0.5%) students are recorded as being at multiple schools, and sometimes multiple grades, in the same year.

At the time of the analysis, there appeared to be 30 000 students missing from the 2020 enrolment set. That is about one third of the total enrolments.

A small number of student records have unlikely dates of birth. For example, according to the data, there were 31 students in Grade 2 in 2019 who were at least 13 years old.

Given the number of students who are ‘new’ in grades after Grade 1, there may be significant occurrences of a new enrolment being ‘created’ rather than linked to an existing student.

Annex 3 – Infrastructure Questions

Schools were assessed ('Yes' or 'No') against the following 37 features–

WASH	2 litres of drinking water / pupil / DAY.
	TWO working toilets - one each for boys & girls
	One toilet must be accessible by the less able.
	Water & soap next to toilets for hand washing
	Rubbish collection area – away from buildings
	Rubbish bin in every classroom.
	One working toilet for staff.
Security	Clear signpost at entrance with school name
	Boundary of land clearly identified
	A fence which prevents people walking thru the site
	All floors should be 150mm above the ground level
	A lease or letter of agreement with landowner
	A notice board for displaying public notices
Classrooms	Minimum floor space 1.5 square metres/student.
	Desk & chair for every P3 to P6 pupil.
	Blackboard 2400mm long x 1000mm high
	Desk and chair for every teacher
	Display board at least 1000mm x 2400mm.
	At least 1 classroom should be accessible to physically less able.
	Classrooms have NO leaking roofs
	Floors should be smooth cement
	Opening windows /or shutters on both sides of the room – minimum area 5 metres squared
Storage	Storeroom minimum size 3000mm x 2400mm
	Locking door & shutters for security
	Store must be wind and watertight
	Shelves 12 number - 3000 mm long x 300 mm wide.
Administration	Office size – 3000 mm x 4000 mm Minimum
	Desk & chair for administrator/head teacher
	Lockable door
	Pin board for notice display
	Two visitors chairs/stools or a bench
Play areas	Play area – 2 square meters / pupil
	Sports areas - minimum size 50 X 35 metres.
	Shaded areas for resting and play.
	Locally built Nakamal for play/ rest /shelter and school meetings – 1 metre square / pupil
	Sports pitches must have posts and nets
	Play equipment such as swings, see saw, etc

Annex 4 – Students in Grade 6 in 2019.

Where were they in 2017 and 2018?

2017		2018		2019	
Grade 2	*1*	Grade 3	*3*	Grade 6	*6862*
Grade 3	*2*				
Grade 2	*2*	Grade 4	*44*		
Grade 3	*26*				
Grade 4	*11*				
not registered	*5*				
Grade 2	*2*	Grade 5	*5783*		
Grade 3	*30*				
Grade 4	*4670*				
Grade 5	*324*				
not registered	*730*				
Grade 4	*6*	Grade 6	*203*		
Grade 5	*161*				
Grade 6	*3*				
not registered	*33*				
Grade 6	*1*	Grade 7	*1*		
Grade 4	*40*	not registered	*814*		
Grade 5	*23*				
Grade 6	*7*				
not registered	*742*				

Annex 5 – Tables

GER and NER 2012 - 2019

	2012	2013	2014	2015	2016	2017	2018	2019
Primary GER	121	119	121	118	112	119	125	127
Primary NER	86	86	88	86	85	90	92	96
Secondary GER	40	42	50	51	45	47	48	47
Secondary NER	31	33	35	35	42	43	42	43
ECCE GER					60	101	106	118
ECCE NER					33	66	78	87

NER, GER and GPI by province and gender

	Torba	Sanma	Penama	Malampa	Shefa	Tafea	Vanuatu
Secondary							
GER Male	26.0	50.1	29.2	40.9	50.3	42.9	44.1
GER Female	29.5	57.3	33.2	48.7	59.1	42.3	50.0
NER Male	22.8	46.5	25.4	37.5	46.7	35.8	40.0
NER Female	27.8	53.9	29.4	45.6	56.4	37.1	46.7
Gender Parity Index (GPI)	1.13	1.14	1.14	1.19	1.17	0.99	1.13
Primary							
GER Male	112.4	142.9	108.4	145.3	103.9	178.9	129.5
GER Female	124.4	138.0	105.5	139.2	101.3	164.9	124.8
NER Male	79.0	**107.5**	79.3	**110.9**	81.4	**122.2**	96.5
NER Female	90.2	**106.0**	78.0	**110.1**	82.0	**116.6**	95.7
Gender Parity Index (GPI)	1.11	0.97	0.97	0.96	0.97	0.92	0.96
ECCE							
GER Male	131.7	120.2	94.2	115.6	91.2	137.7	108.9
GER Female	142.2	133.3	101	130.8	91	138.3	115.0
NER Male	79	91.2	73.3	95.8	70.5	**107.7**	84.0
NER Female	81	**102.1**	80.2	**109.1**	71.2	**108.7**	89.4
Gender Parity Index (GPI)	1.08	1.11	1.07	1.13	1.00	1.00	1.06

Source: 2019 MoE Data Tables - Tables 15 - 18

Number and gender of teachers by province and school type - 2019

	Torba	Sanma	Penama	Malampa	Shefa	Tafea	Vanuatu
ECCE - Male	16	8	4	6	10	6	50
ECCE - Female	54	273	176	271	236	254	1264
ECCE - total	70	281	180	277	246	260	1314
Primary - Male	38	176	79	156	191	159	799
Primary - Female	46	295	96	181	356	155	1129
Primary - Total	84	471	175	337	547	314	1928
Secondary - Male	8	156	47	72	224	53	560
Secondary - Female	12	105	27	50	195	39	428
Secondary - Total	20	261	74	122	419	92	988

Source MoET Statistics Report 2020 p25 - Table 26

2019 Student Teacher Ratios by Province

	Torba	Sanma	Penama	Malampa	Shefa	Tafea	Vanuatu
ECCE	12.0	13.8	10.2	8.8	19.1	10.6	12.5
Primary	24.8	26.1	34.1	25.8	27.4	34.3	28.4
Secondary	25.6	20.1	24.1	24.4	18.7	32.8	21.6

Source MoET Statistics Report 2020 p27 - Table 29

Enrolment numbers 2015 - 2020: Source: Open VEMIS April 2020

Grade	2015	2016	2017	2018	2019	2020
P	9222	8785	14883	16375	16525	5149
1	9672	8957	10969	11201	10500	5246
2	8147	8417	8781	10485	10833	8709
3	7729	7893	8503	8965	10484	9181
4	6779	7167	7623	8189	8660	8884
5	6257	6496	6887	7272	7706	7354
6	5784	6013	6200	6572	6947	6485
7	4368	4211	4667	5045	5452	3603
8	3471	3773	3851	4302	4366	4072
9	3284	3229	3347	3438	3861	2614
10	2580	2874	2929	2944	3095	2458
11	1779	1747	1824	1745	2048	1092
12	1480	1465	1512	1407	1514	1158
13	813	932	942	816	1060	744
Total	**73380**	**73975**	**84935**	**90774**	**95070**	**68769**

2019 Retention data by province

a) Number of students in Grades 1 – 5 in 2018 who progressed to the correct next grade in 2019

	Torba	Sanma	Penama	Malampa	Shefa	Tafea	Vanuatu
In the next grade at the same school	1418 *(80.9%)*	7704 *(78.4%)*	3803 *(62.9%)*	5997 *(82.0%)*	9610 *(79.7%)*	6691 *(73.9%)*	35223 *(76.4%)*
In the next grade at a different school in the same province	8 *(0.5%)*	174 *(1.8%)*	110 (1.8%)	48 *(0.7%)*	172 *(1.4%)*	55 *(0.6%)*	567 *(1.2%)*
In the next grade in a different province	4 *(0.2%)*	28 *(0.3%)*	253 (4.2%)	28 *(0.4%)*	28 *(0.2%)*	7 *(0.1%)*	388 *(0.8%)*
Repeated the grade (at any school)	142 *(8.1%)*	634 (6.5%)	719 (11.9%)	540 *(7.4%)*	605 *(5.0%)*	478 *(5.3%)*	3129 *(6.8%)*
Any other grade (at any school)	33 *(1.9%)*	97 (1.0%)	59 (1.0%)	42 *(0.6%)*	94 *(0.8%)*	95 *(1.0%)*	420 *(0.9%)*
Not in any school in 2019	147 *(8.4%)*	1185 (12.1%)	1099 (18.2%)	659 *(9.0%)*	1549 *(12.8%)*	1724 *(19.0%)*	6385 *(13.8%)*
Total	**1752**	**9822**	**6043**	**7314**	**12058**	**9050**	**46112**

b) Number of students in Grade 6 in 2018 who progressed to the correct next grade (Grade 7) in 2019

	Torba	Sanma	Penama	Malampa	Shefa	Tafea	Vanuatu
In the next grade at the same school	34 (12.0%)	445 (34.3%)	22 (2.8%)	40 (3.8%)	729 (36.9%)	72 (6.3%)	1342 (20.4%)
In the next grade at a different school in the same province	49 (17.3%)	405 (31.2%)	262 (33.0%)	315 (29.7%)	603 (30.5%)	389 (33.8%)	2023 (30.8%)
In the next grade in a different province	5 (1.8%)	15 (1.2%)	53 (6.7%)	20 (1.9%)	11 (0.6%)	1 (0.1%)	108 (1,6%)
Repeated the grade (at any school)	6 (2.1%)	30 (2.3%)	56 (7.1%)	33 (3.1%)	63 (3.2%)	18 (1.6%)	207 (3.1%)
Any other grade (at any school)	3 (1.1%)	4 (0.3%)	6 (0.8%)	1 (0.1%)	3 (0.1%)	5 (0.4%)	22 (0.3%)
Not in any school in 2019	187 (65.8%)	399 (30.7%)	395 (49.7%)	652 (61.5%)	567 (28.7%)	666 (57.9%)	2870 (43.7%)
Total	**284**	**1298**	**794**	**1061**	**1976**	**1151**	**6572**

Note: Many students need to physically change schools at the end of Grade 6 and many schools do not offer Grades 7 or 8. A lot of students (43.7%) appear to not make the transition.

c) Number of students in Grade 7 in 2018 who progressed to the correct next grade (Grade 8) in 2019

	Torba	Sanma	Penama	Malampa	Shefa	Tafea	Vanuatu
In the next grade at the same school	85 (47%)	772 (71.2%)	244 (53.4%)	520 (59.8%)	1067 (65.1%)	566 (69.6%)	3254 (64.5%)
In the next grade at a different school in the same province	11 (6.1%)	34 (3.1%)	32 (7.0%)	22 (2.5%)	32 (2.0%)	43 (5.3%)	174 (3.4%)
In the next grade in a different province	1 (0.6%)	6 (0.6%)	32 (7.0%)	28 (3.2%)	123 (7.5%)	1 (0.1%)	191 (3.8%)
Repeated the grade (at any school)	4 (2.2%)	44 (4.1%)	22 (4.8%)	66 (7.6%)	78 (4.8%)	15 (1.8%)	229 (4.5%)
Any other grade (at any school)	0 (0.0%)	4 (0.4%)	0 (0.0%)	0 (0.0%)	9 (0.5%)	1 (0.1%)	14 (0.3%)
Not in any school in 2019	80 (44.2%)	225 (20.7%)	127 (27.8%)	234 (26.9%)	330 (20.1%)	187 (23.0%)	1183 (23.4%)
Total	**181**	**1085**	**457**	**870**	**1639**	**813**	**5045**

d) Number of students in Grade 8 in 2018 who progressed to the correct next grade (Grade 9) in 2019

	Torba	Sanma	Penama	Malampa	Shefa	Tafea	Vanuatu
In the next grade at the same school	57 (50.9%)	257 (28.1%)	180 (49.2%)	322 (50.5%)	340 (21.9%)	349 (48.3%)	1505 (35.0%)
In the next grade at a different school in the same province	2 (1.8%)	291 (31.9%)	51 (13.9%)	38 (6.0%)	460 (29.6%)	103 (14.3%)	945 (22.0%)
In the next grade in a different province	2 (1.8%)	63 (6.9%)	25 (6.8%)	45 (7.1%)	151 (9.7%)	11 (1.5%)	297 (6.9%)
Repeated the grade (at any school)	0 (0.0%)	47 (5.1%)	8 (2.2%)	8 (1.3%)	31 (2.0%)	5 (0.7%)	99 (2.3%)
Any other grade (at any school)	3 (2.7%)	12 (1.3%)	0 (0.0%)	0 (0.0%)	6 (0.4%)	4 (0.6%)	25 (0.6%)
Not in any school in 2019	48 (42.9%)	243 (26.6%)	102 (27.9%)	224 (35.2%)	564 (36.3%)	250 (34.6%)	1431 (33.3%)
Total	**112**	**913**	**366**	**637**	**1552**	**722**	**4302**

e) Number of students in Grade 9 in 2018 who progressed to the correct next grade (Grade 10) in 2019

	Torba	Sanma	Penama	Malampa	Shefa	Tafea	Vanuatu
In the next grade at the same school	50 (51.0%)	408 (54.3%)	197 (53.0%)	358 (60.3%)	745 (61.7%)	261 (62.7%)	2019 (58.7%)
In the next grade at a different school in the same province	0 (0.0%)	42 (5.6%)	26 (7.0%)	12 (2.0%)	35 (2.9%)	16 (3.8%)	131 (3.8%)
In the next grade in a different province	3 (3.1%)	30 (4.0%)	23 (6.2%)	32 (5.4%)	99 (8.2%)	3 (0.7%)	190 (5.5%)
Repeated the grade (at any school)	1 (1.0%)	45 (6.0%)	17 (4.5%)	40 (6.7%)	36 (3.0%)	17 (4.1%)	156 (4.5%)
Any other grade (at any school)	0 (0.0%)	4 (0.5%)	2 (0.5%)	1 (0.2%)	0 (0.0%)	0 (0.0%)	7 (0.2%)
Not in any school in 2019	44 (44.9%)	222 (29.6%)	107 (28.8%)	151 (25.4%)	292 (24.2%)	119 (28.6%)	935 (27.2%)
Total	**98**	**751**	**372**	**594**	**1207**	**416**	**3438**

Annex 6 2016 Population Data

Number of students in 2016 by gender and province

Age	Torba		Sanma		Penama		Malampa		Shefa		Tafea		
(in 2016)	M	F	M	F	M	F	M	F	M	F	M	F	
0	149	160	796	726	438	430	403	433	1070	1120	507	456	
1	145	151	823	696	564	452	682	615	1335	1218	620	578	
2	154	136	906	790	512	506	621	593	1389	1245	636	615	
3	168	162	875	822	559	462	650	644	1384	1333	621	599	
4	170	139	859	801	527	484	673	607	1279	1169	631	592	
5	141	127	832	714	517	489	615	589	1300	1180	697	610	
6	152	159	874	794	597	535	668	654	1226	1193	683	671	
7	154	138	749	687	522	467	615	556	1070	1058	595	565	
8	131	131	672	667	484	426	580	543	1009	973	638	612	
9	159	163	674	586	462	428	632	548	1129	1033	599	493	
10	138	113	663	615	514	469	613	516	1050	960	730	623	
11	125	122	504	506	355	331	468	478	908	869	436	379	
12	135	130	673	515	409	425	529	480	994	922	618	528	
13	114	104	489	492	307	297	415	361	897	780	449	425	
14	106	103	504	461	299	230	360	302	754	760	457	407	
15	107	85	411	385	188	212	322	279	763	750	369	328	
16	98	91	586	503	271	230	365	330	886	973	348	361	
17	81	68	475	461	200	167	247	255	805	756	324	255	
18	76	89	533	502	240	215	333	282	921	999	310	320	
19	87	86	508	505	212	208	270	251	997	988	251	330	
20	80	106	507	625	244	266	292	356	1007	1097	275	370	

Sourced from 2016 Mini Census Province Excel data

Number and proportions of students in 2016

Age	Associated Grade	Total Students	# not at school	% not at school
4	Pre-School	7939	4077	51.4%
5	Pre-School	7816	2012	25.7%
6	1	8225	1265	15.4%
7	2	7214	789	10.9%
8	3	6924	703	10.2%
9	4	6969	640	9.2%
10	5	7075	661	9.3%
11	6	5565	481	8.6%
12	7	6499	708	10.9%
13	8	5444	704	12.9%
14	9	5263	874	16.6%
15	10	4906	1429	29.1%
16	11	5920	2158	36.5%
17	12	4853	2153	44.4%
18	13	5284	2952	55.9%

Annex 7 – Terms of Reference

Terms of Reference for a Data-Analyst Consultant

Expected time frame: 30 days

Location: home-based

VESP II is conducting a study about how gender issues affect the schooling of boys and girls in Vanuatu. There are three components to this study, one of the components is the analysis of the data collected and stored by the Open Vanuatu Education Management Information System (Open VEMIS). The Open VEMIS contains and sources data from all schools in Vanuatu. These data range from the individual student level to the school level, and includes close to 10 Grades of data collection. The consultant will also have access to the Vanuatu Standardized Testing (VANSTA) data to complement the investigation.

The data analysis will focus on issues affecting students' enrolment and attainment. The exact questions of interest will be discussed with VESP's M&E Adviser and Team Leader. It is expected it will explore possible correlations and interactions between the existing school attributes, such as infrastructure, level of principal's education and gender related outcomes, such as Gender Parity Index, Survival Rate (broken down by gender), Enrolment rates, etc..

Likely questions to be explored are:

1. Does the gender of teachers affect the schooling of boys and girls? If so, how?
2. Does the gender of principals affect the schooling of boys and girls? If so, how?
3. What are significant interactions between location (rural and urban) and principals' attributes (gender, level of education, age, experience, etc.) in determining the schooling of boys and girls?
4. How does infrastructure (access to water, electricity, furniture, etc.) aspects of the schools correlate with the schooling of boys and girls;
5. What are the significant interactions between infrastructure and other factors, in determining the schooling of boys and girls?
6. What are the correlations between infrastructure and geo-location?
7. How boys and girls' performance in the VANSTA correlate to gender variances in GPI, principals' attributes and other school level characteristics?

Other questions may emerge during the consultations with the local stakeholders, and the questions above may also change. However, they serve as a guide to the expected nature of the questions and line of inquiry. These consultations will be led by VESP's Team Leader, in close coordination with the M&E adviser and the selected consultant.

VESP II is seeking to hire a consultant to carry out this data analysis.

Tasks:

The selected consultant will:

1. Study the data set in order to understand its many variables and coding structure;
2. Reorganize the data set as needed, in order to analyse it;
3. Produce a statistical summary, with graphics and tables, of the break down of enrollment rates of students in different levels, teachers and principals, in different locations (rural, urban, by provinces, by management agency, etc.) throughout the Grades.
4. Conduct regressions and ANOVAs, as required, to find relevant correlations and dynamics of change;
5. Conduct the analysis using standard statistical procedures to ensure the findings are statistically reliable;
6. Report the findings in a written report accompanied by the relevant tables, charts and graphs, as required;
7. Liaise regularly with the M&E adviser and the Team Leader to clarify aspects as required.

Expected outputs:

1. A high-quality report, with an executive summary and with a clear description of the analytical methodology and its findings. The findings should be organized in sections focusing on the agreed questions of interest.
2. A presentation to be delivered remotely about the findings.
3. The files with the data used for the analyses in the structure developed by the consultant.