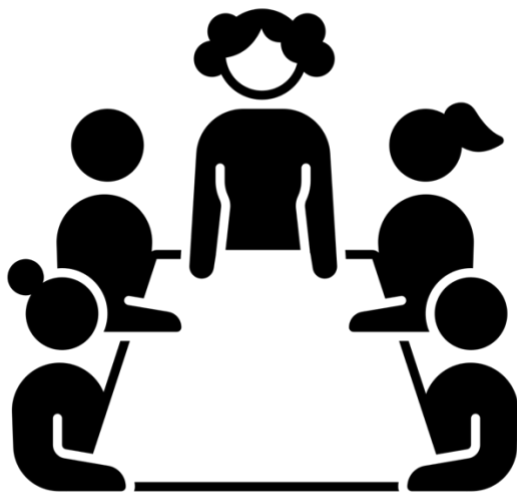**2**

Teacher production, class size & learner population growth

How many teachers will be required for South Africa to maintain or reduce LE ratios given increases in learner population numbers?
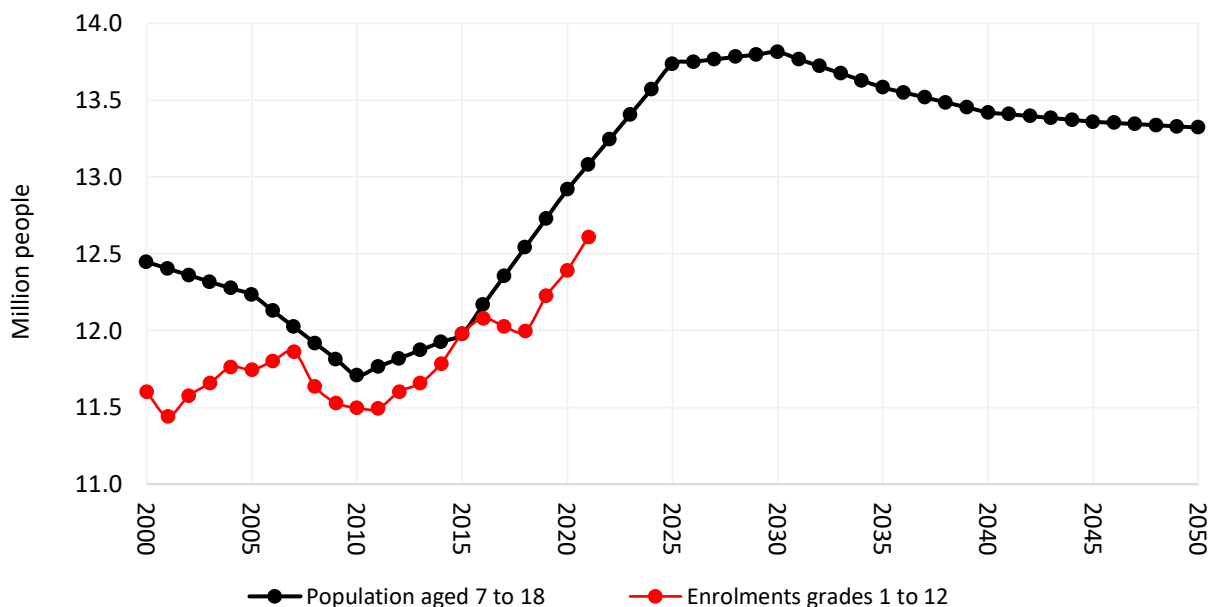
Nic Spaull (10 Nov 2022)

RESEP
Research on Socio-Economic Policy

Teacher Demographic Dividend.

Factors other than teacher retirements will also require more teachers to be produced and employed, notably population increases and addressing Learner-Educator ratios. While the incoming wave of teacher retirements will require more teachers to be produced by universities and hired by provinces just to maintain teacher headcounts, two other factors are likely to drive further demand for teacher production: (1) increases in enrolment, and (2) reducing Learner-Educator (LE) ratios.

Between 2021 and 2030 the school-age population is projected to increase by 5,6%. Figure 1 below reports the United Nations population estimates for 7-18 year olds in South Africa from 2000 to 2050, as well as enrolment numbers in Grades 1 to 12 from the DBE. Two trends are immediately clear, firstly that since 2007 the enrolment numbers have tracked the UN population estimates fairly consistently. And secondly, the population of 7–18-year-olds is projected to continue to increase to 2030. The increase in the school age population between 2021 and 2030 comes to 5,6%. This suggests that enrolments can be expected to increase substantially to 2030.

If reductions in dropout are also accounted for, enrolment is projected to increase by 6,2%. Apart from the actual number of children in a cohort, if fewer children drop out of school then enrolment numbers also increase. Historically there has been an improvement in retention rates to matric, with public Grade 12 enrolment as a percentage of the 18 year old population increasing by 1,4 percentage points per year between 2012 and 2020. If this trend of higher survival to Grade 12 continues, then enrolments are projected to increase by 6,2% between 2021 and 2030. To maintain Learner-Educator (LE) ratios and prevent class sizes from rising, teacher headcount will also have to increase by 6,2%. This is over and above the teachers needed to replace retiring teachers or other attrition.
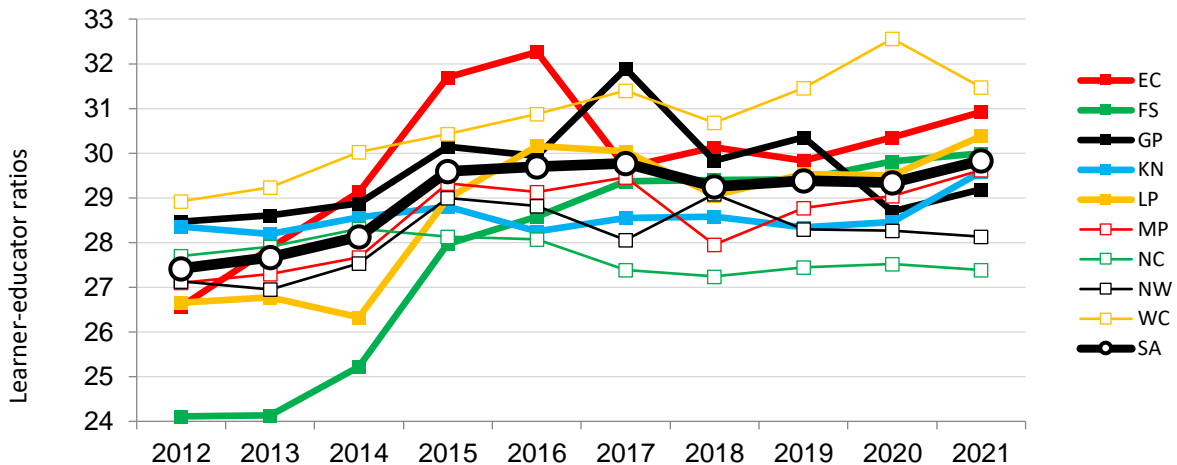
Figure 1: *Child population estimates (2000-2050) and Grade 1-12 learner enrolments (2000-2021)*

Sources: The source for population is the World Population Prospects 2019 of the United Nations, available through https://population.un.org. Figures for ages 7 to 18 were derived, using the UN data and Stats SA's Sprague tool to derive single age values and a simple linear trend to derive years between the every fifth year of the UN data. Stats SA's Sprague tool was last released online together with the 2016 Mid-year Population Estimates files. The source for the enrolment values is published reports of the National Department of Basic Education. These values include both public and independent ordinary schools.

Learner-Educator (LE) ratios have been increasing from 27:1 (2012) to 30:1 (2021), a large increase given that these are national averages. Combining data on publicly-employed teachers and enrolment in public schools, one can generate LE ratios from 2012 to 2021[1]. Figure 2 below reports the LE ratios for public schools by province from 2012 to 2021 showing that the national average LE ratio increased from 27,4 in 2012 to 29,9 in 2021. It is immediately clear that some provinces have experienced much larger LE ratio increases than others. For example, the LE ratio increased by more than 4 learners per teacher in less than 3 years in the Free State, Limpopo and the Eastern Cape between 2013 and 2016. Since 2019 six of the nine provinces have seen increases in their LE ratios (the exceptions are North West, Northern Cape and Western Cape whose LE ratios were constant over the period.
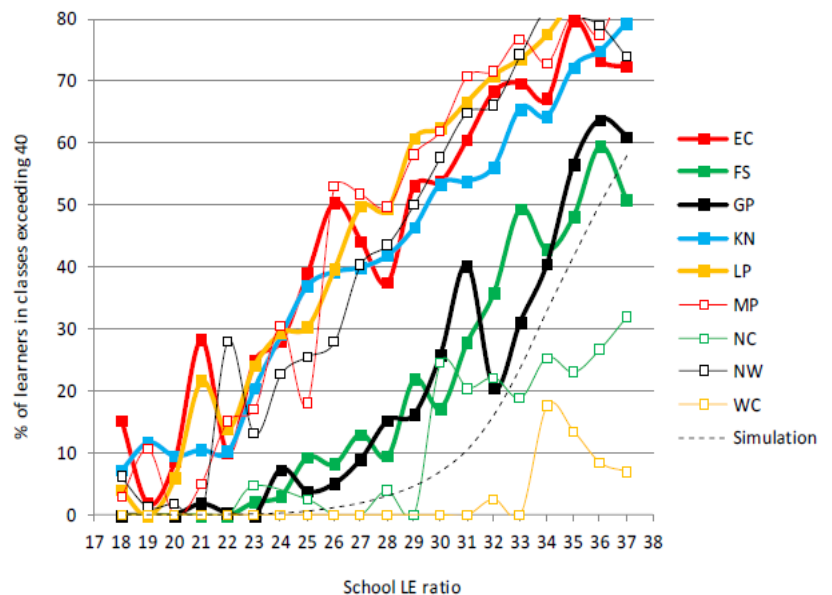
Figure 2: *Public learner-educator ratios from 2012 to 2021*

Source: DBE. 2022. What are our learner-educator (LE) ratio trends? Unpublished report. 18 June 2022.

Learner-educator ratios do affect class size but the impact depends on other factors as well. While the overall learner-educator ratio is relatively straightforward (learners divided by teachers), how this manifests at the school level is complicated and the subject of ongoing research in the Teacher Demographic Dividend project (see Wills et al., forthcoming). Differences in teacher absenteeism, timetabling, subject-choices and classroom availability can all influence realized class sizes over and above the constraints placed by the LE ratio. The LE ratio is certainly not the same as class size. For example, previous analysis has shown that *for a given LE ratio* different provinces have different levels of crowded classrooms. For example, a school LE ratio of about 32 learners to one teacher in Gauteng leads to 30% of learners in classes over 40, but 65% of learners in classes over 40 in Limpopo, Eastern Cape, KwaZulu Natal, Mpumalanga and North West (Figure 3). This is even though there are the same number of learners per teacher in these schools.
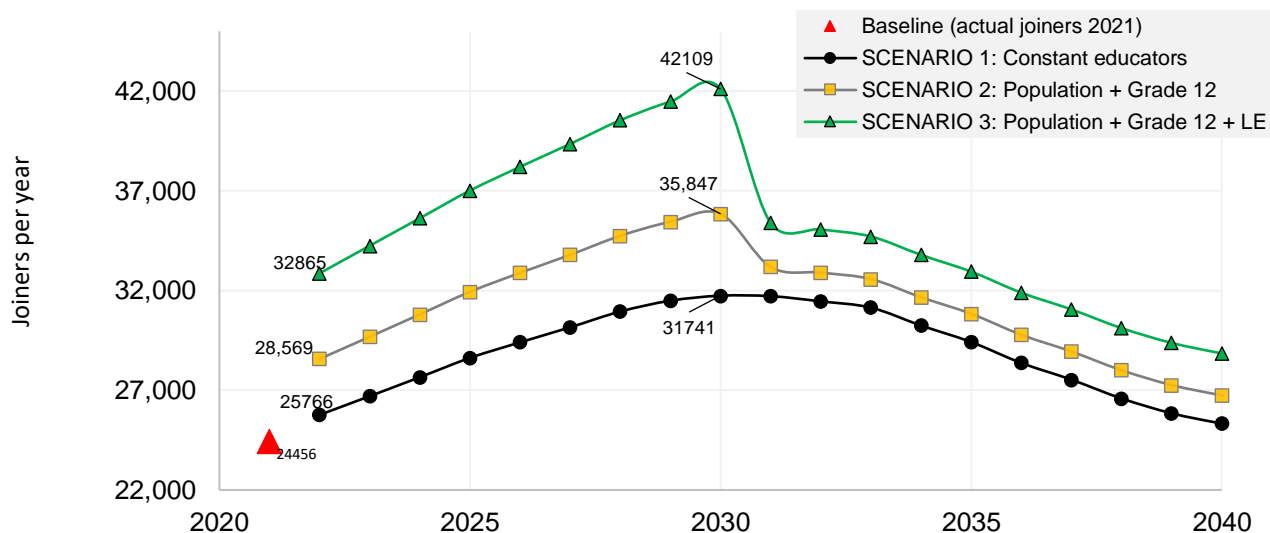
Figure 3: LE ratio required and actual provincial situations (Source: DHET, 2022: p.40)

Returning to South Africa's 2012 LE ratio of 27,4 by 2030 would increase the additional teacher demand from 6,2% mentioned above to 15.8%. Whether South African policymakers continue to allow the LE ratio to increase will influence the number of teachers needed to be trained and employed. If the decision is made to return to South Africa's 2012 LE ratios (and even that ratio is higher than comparable countries internationally[2]) it will require many more teachers to be trained and employed. In Figure 4 below, Gustafsson (2022) estimates the projected number of teachers required under three different scenarios:

- **Scenario 1: Constant educators.** This assumes that the total headcount of teachers will need to stay constant. The increase needed in joiners is primarily driven by retiring teachers and other 'leavers.'

- **Scenario 2: Population + Grade 12**. In this scenario, in addition to accounting for retiring/leaving teachers, the growth in the school-going population and Grade 12 survival rates are taken into account. Therefore, in this scenario more teachers are hired to prevent the LE ratio rising further from its 2021 level. This scenario maintains the LE ratio in spite of the increased school-going population and greater throughput to matric (as described above).

- **Scenario 3**: **Population + Grade 12 + LE.** In this scenario, in addition to taking into account (a) retirements/leavers, (b) the growth in the school going population and retention to Grade 12, it also (c) improves the LE ratio gradually in such a way that by 2030 the LE ratio is back to its 2012 level of 27,4 by 2030. The big decline after 2030 in both Scenario 2 and 3 is driven by both teacher demographics (older teachers leaving) *and* learner demographics (enrolments increasing), both of which coincidentally and unrelatedly peak at 2030 and decline thereafter

Figure 4: *Number of teachers ('all joiners') required to join the public schooling sector under different scenarios 2021-2040*
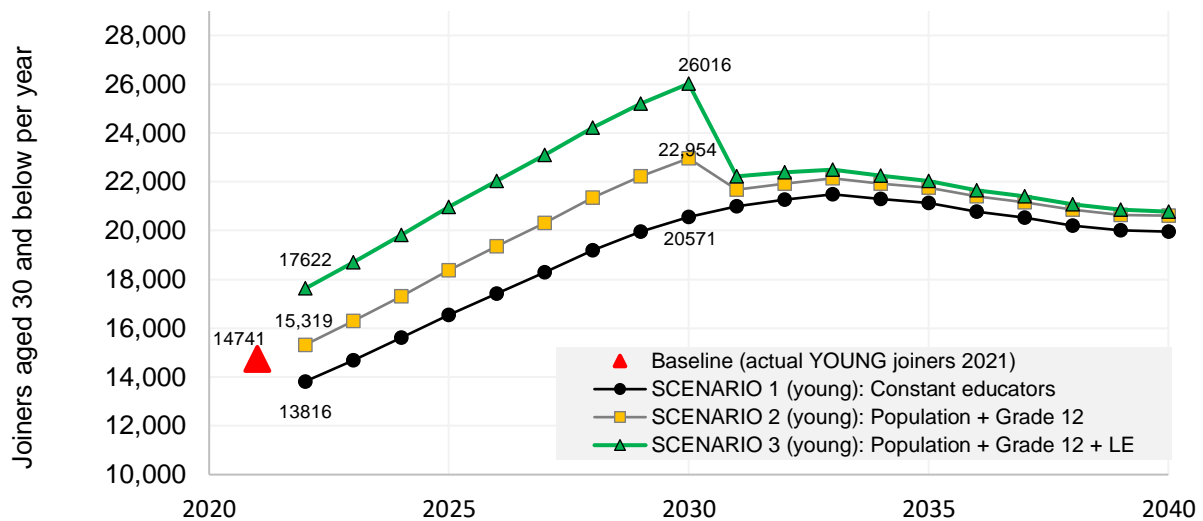

Source: Gustafsson, 2022 Projections

Additional teachers required will increase from about 25,000 (2021) to 32,000 (Scenario 1), 36,000 (Scenario 2), or 42,000 (Scenario 3) depending on policy directives. In 2021 there were 24,456 annual 'joiners' into the public system, by 2030 this will have to increase to 31,741 (Scenario 1), 35,847 (Scenario 2), or 42,109 (Scenario 3) depending on policy directives related to teacher headcount, LE ratios and class sizes. It is clear that choices regarding these factors will have a very large impact on the number of teachers that need to be produced since typically only 60-75% of teachers that graduate join the public education system. Note that Figure 4 reports 'all joiners' (i.e. young joiners graduating from universities and older joiners coming from the reserve pool or elsewhere). Figure 5 below reports only the number of young joiners.

Young joiners will need to increase from around 15,000 to around 23,000 in 2030 (or 26,000 to return to 2012's LE ratio): Figure 5 below reports projections of the needed 'young joiners', i.e. new teacher graduates. It is important to emphasize that not all teachers produced by universities go on to be employed in schools, or in public schools. Figure 5 reports joiners in public schools. Although approximately 28,000 teachers were produced in 2019 (see Note 6), only about 15,000 joined in 2021. This ratio of produced:joiners fluctuates and has been as high as 75% and as low as 50% historically.

Figure 5: *Number of teachers ('young joiners') required to join the public schooling sector under different scenarios 2021-2040*

Source: Gustafsson, 2022 Projections

Current modeling is ongoing and projections can be sensitive to assumptions: The Teacher Demographic Dividend research project is a three-year programme and 2022 is the first year of research. Modeling demographic changes with respect to teacher supply (university production), theoretical demand (to replace retirees or maintain LE ratios) and realized teacher demand (whether provinces hire) is a difficult exercise. There are many assumptions that influence these projections. Wherever possible we have used historical numbers to calibrate projections. Yet even here the historical numbers differ depending on the period under analysis (for example whether 50% or 75% of teacher graduates enter public schools). Whether younger teachers leave teaching in higher numbers (as they did in 2010-2011) also influences how many teachers will be required, and would increase graduates required over and above those listed in the figures above. See Figure 12, 15 and 16 in Gustafsson (2022) for estimates under 'high attrition.' Nevertheless, modeling presented here and elsewhere in the TDD project is imperative for policy makers to understand how the incoming retirement wave will affect graduate production, hiring, class sizes etc. The financial implications of the retirement wave will be dealt with in Q1-2 of 2023.

Endnotes

[1] Department of Basic Education (2022). What are our learner-educator (LE) ratio trends? (18 June 2022). Unpublished report. Pretoria. Figure 4

[2] Department of Higher Education and Training (2020). School teacher supply and demand in South Africa in 2019 and beyond. Pretoria. (page 44)