Supplementary Resource

What do changes in the demand and supply of educators mean for universities and schools over the next decade?

Video script

Martin Gustafsson (20 July 2023)

This script accompanies the video of the same title. Both the video and the script are supplementary resources accompanying TDD Working Paper F, *Projections of Educators by Age and Average Cost to 2070 (Final Report),* by Martin Gustafsson (2023).

Teacher Demographic Dividend.

RESEP
Research on Socio-Economic Policy

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A note on how the video was produced

First, a multi-slide PowerPoint presentation, with animations, was produced. I broke the entire presentation into parts, each containing one or more slides, as this facilitates fixing. You can fix one part without for instance recording the audio for entire presentation afresh.

Each part of the presentation was put into its own PowerPoint file.

Unfortunately, when it comes to producing videos from PowerPoint, Microsoft and PowerPoint indicate that many things are possible, when in fact they are not. I was using PowerPoint 2016, on Windows 10, and some googling revealed I was not alone in experiencing problems. What is described here is a route that worked, after I had tried a lot of other routes which led to dead ends.

I went to the first slide of a part (or file), and produced an audio for the entire part via Insert > Audio > Record Audio. At that stage I simply read from my script (what appears below), without worrying about the animations. Importantly, after producing the audio, one needs to go into the Animations Pane and make sure the audio is the first item, and that it is 'Start With Previous', and that in the details (double-click the narrations item to go to details) it is clear that the audio will stop playing after X slides, where X is the number of slides in the file. In order for the audio icon not to be visible when the presentation is run, simply place it a little outside the slide area.

Next I went to File > Export and 'Create Video'. I selected Full HD, and then Record a Video. I deselected 'Narrations, ink and laser pointer', and then began the process. The audio should start automatically. Then, I would click my way through the animations, making sure I timed that with the audio I was hearing (having a printout of the script can be useful at this stage, so it is easy to know when in the narrative animations occur). One final click, beyond what is indicated in the script, took me to a dialogue box which asked if I wanted to save the recording – I said Yes. After that was over, I clicked the Create Video button that became visible, selecting .mp4.

One major headache I could not resolve was out-of-control animations in slides with many animations, but this only occurs where one tries to have a lot in one PowerPoint file, or in one slide, as in slides with over about 30 animations (it was difficult to determine the exact cut-off). I would look at the mp4 video and realise that after all worked well for a while, at one point all the animations would happen in quick succession, not at all in the way I'd recorded. Some testing revealed that the problem did *not* reside in the conversion to .mp4. The problem already existed in the supposed synchronisation within PowerPoint. Testing also revealed that it was not a matter of the slide being too long in terms of time. I narrowed down the problem to one of two things: too many animations, or too many items in the animations pane (there can be more of the former than the latter, as one click can animate more than one graphic element).

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I used the Video Editor app which comes with Windows 10 to join multiple .mp4 videos. I also used Video Editor to trim for instance periods of silence at the start or end in all the videos, before uploading onto YouTube.

Meaning of the symbols: Both ► and ● mean the key arrow to the right must be pressed. ► means a shift to a new slide. After each ►, the number of ● should correspond to the number of click-prompted items in the navigation pane for the slide in PowerPoint.

This document is accompanied by an .mp4 file with the final video, and a PowerPoint file. All files carry the same 'Demand and supply' name.

Much of what appears here draws from Gustafsson (2023).

Text in red refers to the numbers of the click-prompted animations in a particular slide. This serves as a background check, and is especially useful to keep track of things during the production of the PowerPoint file, but is not really needed during, for instance, the recording.

Slide 1 ►[1 to 4] This video is produced as part of the ● Teacher Demographic Dividend, or TDD, project, and I'm ● Martin Gustafsson. The project involves collaboration between people in the national Department of Basic Education, RESEP at Stellenbosch, and a few other organisations. ● The question being answered is the following: What do changes in the demand and supply of educators mean for universities and schools over the next decade? What I'll present is projections and conclusions we have come up with in the project, after a lot of analysis and discussion among analysts. ● This video is accompanied by a few things, including the script used to produce this video, with sources and background reports.

Slide 2 ► [1 to 6] This is what I'll run through. ● I'll first present a scenario to 2035 that focusses on trying to keep the learner-educator, or LE ratio as low as possible, to avoid excessive class sizes. ● Then I'll look at two reasons why more newly graduated teachers joining the public workforce will be needed in the coming years: a wave of educator retirements, and further increases in enrolment numbers. ● Then likely levels of spending on the educator workforce will be examined. ● What it really means when the LE ratio changes will be discussed. ● A couple of alternative scenarios will be presented. ● Finally, conclusions.

Slide 3 ► [1 to 4] Here's the **main graph** of this whole presentation. ● Red represents what we can call **'first-time joiners'** to the publicly paid educator workforce of the nine provincial education departments. *Mostly*, these are young newly qualified teachers though ● in recent years around 28% were above age 30 and 8% were above age 40. These could be people who graduated as teachers relatively late in life, and then joined the public educator workforce. ● We can see that the number of first-time joiners barely increased between 2010 and 2022. ● However, the numbers will undoubtedly increase in the coming years, as we shall see, given in part a bulge of educators reaching retirement.

[5 to 13] ● The green curve represents **newly graduated educators** emerging from our universities. ● In around 2010, and for several years before that, there were relatively few teacher graduates, partly due to the shift to university-only training. ● There were more first-time joiners than graduates. A relatively large pool of older qualified educators was able to fill this gap. How large that pool was, and what remains of it, is difficult to tell. The Department of Education, as it was called then, realised this was not sustainable, and encouraged more youths to choose teaching, for instance through new bursaries. ● This increased new graduates available per year substantially. ● Had the number of first-time joiners increased in line with *enrolments* in schools, many more of the additional graduates would have joined the public system. However, budget constraints meant the total educator workforce remained more or less static. ● This means that a new but small reserve stock of relatively young

teachers available for absorption into the public sector has been built up. ● However, we should not think of all this gap being additional teachers who can be absorbed into the public system. This is because teacher graduates also move into other areas of the labour market, such as independent schools. Roughly, we can say around 80% of teacher graduates seek to enter the public educator workforce, ● 20% seek to work elsewhere. This assumption is used when estimating a total number of *new* graduates needed in, say, 2030, ● which in this scenario is a little over 35,000.

[14 to 18] ● As will be explained, not only will **retirements** make an increase in the number of first-time joiners virtually inevitable, **an increase in the total workforce to stay in line with enrolments** not only seems necessary, but appears affordable, given certain conditions. Some basic numbers. In the scenario you see here, the learner-educator ratio will decline, or improve, from ● 29.8 in 2021 to ● 27.4 in 2030. The LE ratio has been worsening, as it was ● 27.4 in 2011. The scenario presented here thus helps to take the ratio back to a more tolerable level, though even ● 27.4 is high by global standards. As will be explained, this can ease some of the pressures associated with excessive class sizes.

[19 to 20] What about the total number of educators? ● In 2022, there were 403,000 educators, and for almost 20 years, the workforce has remained at about this level. In this scenario, ● the number rises gradually to around 467,000. An increase in the workforce of over 60,000 is of course a major change. The costs and benefits of this need to be weighed up carefully. But as will be seen, this is certainly not impossible, even in an unfavourable economic context. Alternative scenarios involving less workforce growth will also be explored.

[21 to 23] One last point about this main graph. ● The gap above this dotted line reflects first-time joiners who could come from the ● reserve pool of young graduates discussed previously. One effect of this is that it ● gives universities some breathing room, as they do not need to increase graduate outputs substantially over *these* years.

Slide 4 ► [1 to 7] There are **two key reasons why we can expect the number of first-time joiners to grow in future**. ● One is that there is ● **an approaching wave of ageing educators**. Here we see the number of educators at each age. ● In 2022, there was a peak at around age 53. ● In 2025 that peak will be at age 56, and ● in 2030 at around 61. This is from modelling done in the project. The bottom line is we can expect this peak to move out of the system, to be in a way ● replaced by a younger peak of educators. ● The peak is now just under 20,000, so roughly this is the number of educators we can expect to leave in one year when the impact of the wave is felt most.

[8] ● Another way of looking at this is as follows: By 2030, a third of all the educators we had in 2022 would have moved out of the system due to age. By 2035, just over half would have left. That is a lot of renewal of human resources in the schooling system in a relatively short space of time. This carries risks and opportunities.

[9 to 14] ● Here we see the **number of educators leaving, counting just ages 56 to 65**. ● The increase has clearly already started. ● There were peaks in 2015, when unfounded rumours about the pension fund prompted many educators to retire earlier, and in ● 2020 to 2021, relating to the tragic loss of lives due to COVID. ● Our modelling points to the number of *older* leavers reaching just over 17,000 in around 2029, ● and declining sharply thereafter.

Slide 5 ► [1 to 11] The second factor that is likely to push up the number of joiners in future is that the educator workforce should ideally grow, because the **number of learners teachers teach has grown considerably, and will grow further**. We have, and will have, more school-age children in the population than previously expected. ● In 2006, the projections of the UN Population Division looked like this: ● the population aged 7 to 18 was expected to

peak at just over 12 million in 2015, ● and then decline gradually, ● reaching under 10.5 million in 2050. According to this, we should ● be sitting now at a figure of just *under* 12 million. ● However, an updated 2022 set of projections by the UN puts the ● current figure at just *over* 13 million now, ● peaking at around 13.7 by around 2028. ● Even with subsequent declines after 2030, the school-age population will be higher than expected. This change in course was not expected, for instance in the ● National Development Plan, released in 2012. Why did the prospects change so dramatically? Demographers are still not sure exactly what brought this about, but what we do know is that there was an ● unexpected increase in the number of births around here.

[12 to 15] ● Stats SA's population figures essentially agree what with we've seen so far. ● The projections of the Thembisa initiative are not that different. ● And official grades 1 to 12 enrolment figures for all schools are, as one would expect, essentially in line with the population figures. All the statistics point to an upward trend that will continue for five or so additional years. ● *This* is what explains what we saw in an earlier graph, namely the increase in the learner-educator ratio from 27.4 in 2011 to 29.8 in 2021.

Slide 6 ► [1 to 3] **What money is there to spend on the publicly paid educator workforce in the coming years**, and where we are coming from in this regard? ● We should keep in mind there is a two-way relationship between the schooling system and the economy. ● By generating skills needed in the economy, schooling brings about economic development. ● And a larger economy means there is more to spend on teachers.

Slide 7 ► [1 to 5] It is obviously not easy to assess how much there will be to spend on educators over the next decade or so, yet we need to have as clear an idea as is possible, in part because this influences plans for the training of new teachers. If we believe we can spend more on educators in future, we may have to train more teachers at universities now. In projecting forward, it is useful to look at where we are coming from. ● In 2007, the nine provincial education departments spent 139 billion Rand on educators. That's 2007 Rands inflated to 2022 prices. ● That went up to 191 billion in 2022. ● That means that in real terms, what could be spent on educators went up by 38%, or 2.1% per annum. ● At the same time, spending on educators as a percentage of GDP, or the economy as a whole, actually declined, from 3.5% in 2007 to 2.9% in 2022. The ratio of *educator* spending to GDP is important, and is often used to gauge sufficiency of spending. ● However, given the size of South Africa's debt currently, we also need to focus on educator spending over government spending *after* interest payments have been deducted. Because interest payments have risen substantially, and very unfortunately, spending on educators over government's *non*-interest spending actually increased over this period, from 11% to 12%, even if educator spending over GDP declined.

[6 to 9] ● Where did the additional spending on educators go to? 93% went directly to paying educators more, or improving their purchasing power. Educator purchasing power has declined during the most recent and very difficult years, since 2019, but over the 2007 to 2022 period as a whole purchasing power for educators, and for other public servants, improved. What about the remaining 7%? ● A tiny portion, around two billion, went towards growing the workforce, though this growth was small, from 401,000 educators to 405,000 educators. ● And then we can say that a further two billion went towards financing the fact that educators became a little older, the average age rising from 42.8 to 45.1. ●

[10 to 19] Looking ahead, a few key things determine how much there will be in, say, ● 2030 to spend on educators. The biggest factor is economic growth. ● Between 2007 and 2022, growth was low, at 1.3% a year. But it varied a lot. In 2011 it was as high as 3.2%, but then when the 2008 global financial crisis and the pandemic hit us, it became negative. ● In one scenario we look at, future growth is assumed to be better than the historical 1.3%, at 1.8%. Growth of 1.8% is what both Treasury and the IMF project for the coming three or so years.

However, historically those institutions have tended to over-estimate growth. For instance, the IMF has over-estimated South Africa's growth by around 0.8 percentage points, ● implying this 1.8% could become 1.0%. But we cannot be absolutely sure of any of this. ● In a further scenario, we'll assume future growth which is lower than this 1.8%. ● What does this 1.8% growth mean? ● It means we would have 221 billion to spend on educators in 2030, at 2022 prices, ● if we assume a continuation of *this* ratio of educator spending over GDP applies, in other words 2.9%. What this percentage is in future is of course a further vital factor determining spending on educators, ● and as can be seen 2.9% is a conservative value in the historical context: it was 3.5% back in 2007. ● And then thirdly, what happens to our interest payments is important, though that is very difficult to forecast.

[20 to 25] ● In the scenario introduced at the start of this video, it is assumed ● this growth in 2022 to 2030 spending goes towards ● growing the workforce, as opposed to improving purchasing power. As will be explained, ● notch progression still assures educators improvements in purchasing power as they get older, even in this scenario. But as will also be explained, notch progression does not require growth in *overall* spending on educators. So, some additional 20 billion Rand would go towards ● adding some 60,000 educators to the workforce. ● Finally, this little segment beyond the 221 billion is the five billion that is *saved* as a result of a decline in the average age of educators.

Slide 8 ► [1 to 3] We saw in an earlier slide that the learner-educator ratio has increased by over two in the last decade. What does this mean? An increase in the LE ratio of *one* may seem like a small change. However, its effects are large. ● Some modelling shows it increases the average class size by 1.2. ● Because so many learners are already close to being in a class of 40, which is often considered a limit, an LE ratio increase of 1.0 pushes about 6% of learners above this limit. If we look just at grades 1 to 3, some 200,000 learners who were previously in a class *within* the 40 limit, are now above that limit. If the LE ratio increases by *two*, 400,000 learners are pushed above the limit, and so on. ● And an LE increase of one pushes some 100,000 grades 1 to 3 learners above the higher limit of 50 learners in a class.

Slide 9 ► [1 to 6] ● Here is the scenario we have been focussing on so far. We had said, let us undo the worsening of the learner-educator, or LE, ratio that we have seen, from ● 27.4 in 2011 to ● 29.8 in 2021. Let's say we want to ● take it back to 27.4 in 2030. We've already seen that this would require us to have ● 467,000 publicly paid educators in 2030. That would make the number of new graduates reach around ● 40,000 in 2030. This is a little higher than what we saw in the previous graph as here we are using a slightly more conservative assumption regarding the reserve pool.

[7 to 13] As we've already seen, bringing in an additional 60,000 or so educators into the workforce is not incompatible with projections for the economy of the country. But then we must assume that ● cost-of-living adjustments remain pegged to inflation, or official CPI. That would be a departure from past years, where ● between 2015 and 2019 cost-of-living adjustments were on average 1.8 percentage points *above* inflation, and where ● between 2019 and 2023 these adjustments have been on average 2.5 percentage points *below* inflation. In the future years modelled here, ● across all scenarios, there would be a zero difference. If inflation is 5%, the cost-of-living adjustment will be exactly 5%. ● But let's be clear. Cost-of-living adjustments mean changes to the value of the salary notches. What also happens every year is ● *notch progression*. Virtually all educators move up notches every year in a manner that improves their purchasing power by at least 1.5%. If you are promoted to a higher position, such as a head of department, this improvement would be much larger. ● So the zeros seen here do not mean that educators do not see improvements to their purchasing power. Notch progression provides at least a 1.5% improvement for everyone each year.

[14 to 18] ● To understand what the overall wage bill will look like in future years, we must look at what happens to the ● average unit cost of an educator, with benefits taken into

account. ● The model used for the project points to the increase in the average cost, in real inflation adjusted terms, being virtually zero in this scenario. This might seem strange if one considers that each year ● notch progression gives every educator 1.5% extra. Why does the average cost not rise by around 1.5%? This is because of a so-called demographic dividend. ● The average age of educators in this scenario is declining, from 45 in 2023 to 41 in 2030. Younger educators earn less, so if the average age declines, this pushes the average cost down. The various factors work together in such a way that the average unit cost does not increase over this period. Even increases for the decade beyond 2030, are low.

[19] ● Of course, the total cost will go up here, because so many more educators are being employed. The increase in the total wage bill, in real terms, is 1.8% a year. Coincidentally, this equals what Treasury and the IMF have forecast for GDP growth over the medium term.

[20 to 22] ● While the increased production of graduates in this scenario by universities does not seem like an insurmountable barrier, there are some concerns. ● Would the schooling system be able to absorb an increase in the workforce of 60,000 people between now and 2030? ● Tackling the LE ratio requires not just having educator numbers keep up with enrolments, but also the necessary physical infrastructure, in particular classrooms.

[23 to 28] ● Here is a scenario where the growth in the workforce is roughly halved. The driver in this scenario is ● requiring the LE ratio not to get worse ● than it currently is, ● though not taking it back to the more favourable level of 2011. ● This would reduce the demand for graduates somewhat, ● and the average annual real increase in the wage bill would be a lower 0.8% a year.

[29 to 35] ● The system has got accustomed, over many years, to having around 400,000 educators. ● What if we continued with the current size of the workforce? In a context of rising enrolments, the problem is obviously that ● the learner-educator ratio would worsen considerably, ● even relative to current levels. It would rise by around 1.8 points. In line with what was seen earlier, ● this translates to around 360,000 learners crossing the 40-learners-in-a-class threshold, just in grades 1 to 3. This is clearly not desirable. ● In this scenario, the average unit cost would increase a little more, mainly because fewer younger teachers, who cost less, would be drawn into the workforce. ● The overall wage bill would barely increase in real terms. In a context of even low economic growth, this would mean educators would comprise a decreasing share of the economy.

Slide 10 ► [1 to 5] To conclude, this video aims to put forward facts and inter-relationships that must be understood when navigating coming years characterised by further enrolment increases and an increase in the number of retiring educators. There are of course many complexities beyond this short video. But a few pointers would be following. ● Firstly the ultimate aim must be to continue the improvement trajectory the schooling system was on, with respect to critical indicators of learning, up to the start of the pandemic. ● Better teaching and learning depends on capable and motivated teachers. ● Expanding the intake of young people into teacher training, and having more teacher graduates, is likely to have some effect on the quality of teachers, and conceivably the effects could be positive or negative. It depends on how the process is managed. ● Teachers are motivated by many things, pay being just one of them. In general, teachers are *de*motivated by very large classes. ● Whether above-inflation cost-of-living increases, above the existing notch progression, are justified for teachers depends largely on what happens to salaries in the rest of the public service, and in the private sector.

References

Gustafsson, M. (2023). *Projections of educators by age and average cost to 2070: Final report*. Stellenbosch: Research on Socioeconomic Policy.