

The Canary and the Classroom: How South Africa Can Turn Cheap Expertise into Jobs

COMPETITION TOPIC

How should South Africa redesign education, industrial policy and fiscal incentives to harness artificial intelligence for productivity growth while limiting labour market disruptions?

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1. Introduction

Coal miners once carried canaries underground because the birds reacted to poisonous gas first, giving them time to clear the air. Three Stanford economists have found a new canary. Since generative artificial intelligence (AI) spread, employment of 22- to 25-year-olds in occupations exposed to it in the United States (US) has fallen 19% behind that of peers in less-exposed jobs, while experienced workers have held their ground (Brynjolfsson et al.: 2026). The first casualty of AI may be the entry-level job where young workers gain experience. South Africa can least afford to lose that rung. In mid-2026, 47.4% of South Africans aged 15 to 34 in the labour force were unemployed (Stats SA: 2026b). A young person who never finds a first job cannot gain the experience employers seek.

South Africa meets AI with two crises that feed each other. Real GDP grew by 0.5% in 2024 and an estimated 1.4% in 2025 (National Treasury: 2026), while unemployment reached 33.6% in mid-2026 (Stats SA: 2026a). A technology that raised output per worker while closing the door to first jobs would ease the growth crisis by deepening the unemployment crisis.

The optimistic reading of the technology rests on field experiments in which AI tools raised the productivity of inexperienced and less-skilled workers most (Noy and Zhang: 2023; Brynjolfsson et al.: 2023). The pessimistic reading rests on the canary result and on evidence that clerical work is the occupation most exposed to generative AI (Gmyrek et al.: 2025). Which reading prevails depends on whether AI is used mainly to automate existing tasks or to create new tasks in which people remain productive (Acemoglu and Restrepo: 2019). For a country where skills are scarce and labour is abundant, cheaper expertise pays off only if workers can use AI and firms use it to support rather than replace them. The tax system must also stop favouring machines over workers.

This essay investigates how South Africa should redesign education, industrial policy and fiscal incentives so that AI raises productivity growth while limiting disruption in the labour market. Section 2 reviews the literature, Section 3 assesses how exposed South Africa is and Sections 4 to 6 examine each policy area. Section 7 concludes and Section 8 sets out recommendations.

2. The economics of cheap expertise

2.1 Complement or substitute?

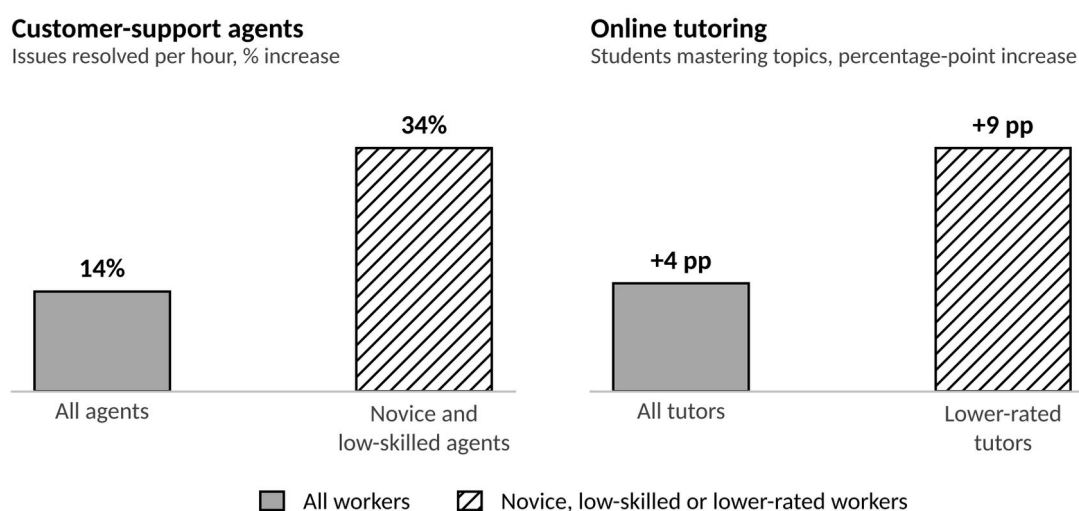
AI can be understood as a fall in the cost of prediction: using available data to fill in missing information (Agrawal et al.: 2018). Diagnosing a patient, drafting a letter and identifying why a learner is struggling all involve prediction, which is much of what professionals are paid for. When an input becomes cheaper, firms use more of it and of its complements, so the key question is whether workers complement cheap expertise or are replaced by it.

In the task-based framework, automation displaces workers from tasks that machines take over, but the resulting productivity gains raise the demand for labour in other tasks, while new tasks reinstate labour where people have a comparative advantage (Acemoglu and Restrepo: 2019). The danger lies in what these authors call “so-so technologies”: technologies that are good enough to replace workers but not productive enough to raise the demand for labour elsewhere. For South Africa, with its mass unemployment, this would be the worst outcome.

2.2 Who gains and when

Field experiments now show who gains from AI. In a study of 5,179 customer-support agents, an AI assistant raised issues resolved per hour by 14% on average and by 34% for novice and low-skilled agents, apparently by passing on the methods of the best agents (Brynjolfsson et al.: 2023). Figure 1 below sets these results beside a randomised trial among online tutors (Wang et al.: 2024), comparing the average improvement with that of the least experienced or lower-rated workers.

Figure 1: AI assistance helps novice and lower-rated workers most



Source: Own compilation (Brynjolfsson et al.: 2023; Wang et al.: 2024)

Figure 1 shows that in both studies the improvement for the least experienced (or lower-rated) workers was more than double the average. Novice and low-skilled agents resolved 34% more issues

per hour against 14% for all agents, while students of lower-rated tutors were 9 rather than 4 percentage points more likely to master a topic. An economy short of experienced workers therefore stands to gain most, provided that inexperienced workers are hired to use AI.

The canary study shows the downside: among young US workers, employment fell most in occupations where AI mostly replaces human tasks and held steady or grew where it mostly assists workers (Brynjolfsson et al.: 2026). The technology that shortens the learning curve can remove the jobs where learning happens.

AI also offers a less obvious opportunity. A paper that recent research still treats as seminal (Duernecker et al.: 2024) showed that labour-intensive services such as education and health care grow more expensive, because their productivity rises slowly while their wages keep pace with the rest of the economy (Baumol: 1967). By giving a teacher, tutor or nurse access to expertise they lack, AI could raise productivity in these services. This essay calls this the Baumol opportunity.

3. Where South Africa is exposed

3.1 Desk jobs under pressure

The International Labour Organization estimates that one in four workers globally holds a job with some exposure to generative AI (Gmyrek et al.: 2025). Table 1 below applies this approach to Quarterly Labour Force Survey (QLFS) data. It compares a “desk-based” group of managers, professionals, technicians and clerks, where exposure concentrates, with a “hands-on” group of the rest.

Table 1: Employment by occupation group, Q2 2025 and Q2 2026 (thousand)

Occupation	Q2 2025	Q2 2026	Change	Change (%)
Manager	1,507	1,459	-48	-3.2
Professional	983	916	-67	-6.8
Technician	1,565	1,460	-105	-6.7
Clerk	1,813	1,788	-25	-1.4
Desk-based subtotal	5,868	5,623	-245	-4.2
Hands-on subtotal	10,938	11,106	+168	+1.5
Total employment	16,807	16,739	-68	-0.4

Source: Own tabulation from QLFS Table C (Stats SA: 2026a); the total includes other occupations

Table 1 shows that 5.6 million South Africans, a third of the employed, hold desk-based jobs. This is an upper bound on exposure, not a forecast of job losses. In the year to mid-2026, desk-based jobs fell by 245,000 while hands-on jobs grew by 168,000. One year of data cannot attribute this to AI, given weak growth, public hiring restraint and sampling error, but the pattern fits the canary result.

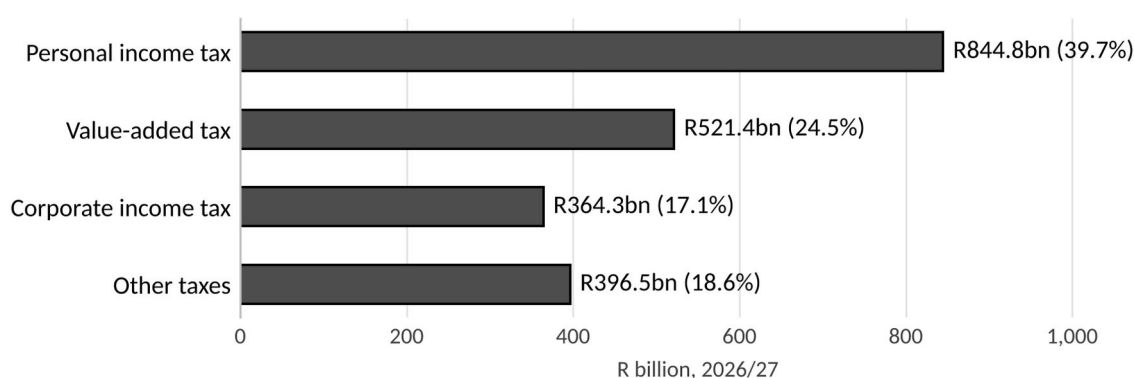
Global business services (GBS), such as contact centres serving foreign clients, best show whether AI will remove or upgrade entry-level desk jobs. The sector created 26,346 jobs for international clients in

2025, about 90% of them filled by young adults (Mzekandaba: 2026). Operators that refuse AI risk losing contracts to technology-assisted rivals in Manila or Pune, while those that adopt it need fewer agents. The sector target of 500,000 new jobs by 2030 (Mzekandaba: 2026) depends on moving workers from routine voice work to complex, AI-supported services.

3.2 The fiscal stakes

Personal income tax (PIT) links the labour-market effects of AI to the budget, because the top-earning 13% of individual taxpayers pay more than 60% of it (National Treasury: 2026). Figure 2 below shows the composition of gross tax revenue in 2026/27.

Figure 2: Composition of gross tax revenue, 2026/27 (R billion)

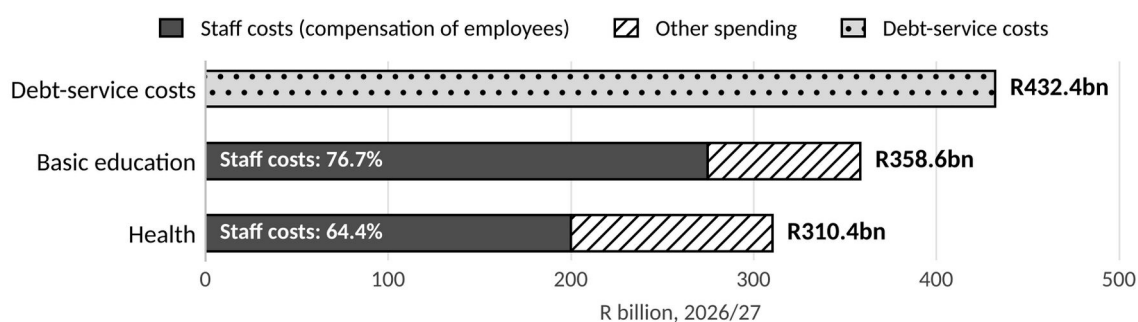


Source: Own calculation (National Treasury: 2026)

Figure 2 shows PIT is the largest tax, at R844.8 billion or 39.7% of the total. If AI cuts entry-level desk jobs, fewer young workers will start careers leading to the higher tax brackets, which generate most PIT revenue. The 2026 Budget Review lists faster AI adoption among the upside risks to global growth (National Treasury: 2026), but this downside risk to the PIT base deserves equal attention.

Figure 3 below compares debt-service costs with spending on basic education and health.

Figure 3: Debt-service costs versus education and health spending, 2026/27 (R billion)



Source: Own calculation (National Treasury: 2026)

Figure 3 shows that debt-service costs of R432.4 billion currently exceed spending on basic education (R358.6 billion) and health (R310.4 billion). Staff costs account for 76.7% and 64.4% of these budgets respectively. Here lies the Baumol opportunity: teachers, nurses and other staff in both sectors cost R475 billion a year, so a 1% productivity gain would be worth almost R5 billion.

3.3 Weak policy and skills foundations

A draft National AI Policy approved by Cabinet in March 2026 (Cliffe Dekker Hofmeyr: 2026) was withdrawn because it cited fictitious sources. The Minister said that the most plausible explanation was that “AI-generated citations were included without proper verification” (SAnews: 2026). The incident shows that AI adds value only where people can check its output.

The levy-funded skills system that should build this capability is underperforming. The Sector Education and Training Authorities (SETAs) and the National Skills Fund (NSF) “reportedly held R40 billion in unspent cash reserves” in 2024/25 (Portfolio Committee on Higher Education: 2025). The SETA system achieves only 4% to 6.6% of its target of training about 10% of the workforce each year, at a cost of R388,052 per certification for a substantive qualification, more than the R370,923 cost per university graduate (Botha et al.: 2025). Private employers, universities and colleges also train workers, but the levy system is the main public channel for workplace training.

4. Redesigning education

4.1 Literacy comes first

The AI tools in Section 2.2 take written instructions and return written answers (Noy and Zhang: 2023; Brynjolfsson et al.: 2023), so using them well requires reading for meaning. Using them safely requires checking their output. Consultants using AI on a task beyond its abilities were 19 percentage points less likely to answer correctly than those without it (Dell’Acqua et al.: 2023).

South Africa starts from a weak base. In the 2021 Progress in International Reading Literacy Study (PIRLS), the latest round with published results (IEA: n.d.), 81% of South African Grade 4 learners could not read for meaning in any language (Metelerkamp: 2023). This is the deepest reason AI may substitute South African labour rather than complement it. Because AI output must be read, understood and checked before it is used, the technology will favour the 19% of learners who can read for meaning over the 81% who cannot. A child who cannot understand a paragraph cannot direct, question or correct an AI system, so foundational literacy and numeracy must come first.

4.2 An AI-assisted reading corps

In a randomised trial in 120 no-fee schools in Limpopo, matriculants selected, trained and supported by the non-profit Funda Wandé were placed in early-grade classrooms. By the third term of Grade 2, their learners outperformed those in control schools by about 0.5 standard deviations in literacy and

numeracy, roughly 1.25 years of learning (Ardington: 2023). The Basic Education Employment Initiative (BEEI), which had not itself been evaluated by then (Ardington: 2023), has shown that assistants can be deployed at scale, employing about 1.4 million people in schools since 2020 at a total cost of R31.3 billion (Ntsaluba: 2026). The BEEI is nevertheless being scaled back. The 2026 Budget cut its allocation from R5.6 billion to R340 million, while the Unemployment Insurance Fund (UIF), which provided R4 billion for the programme, will release no more money until its fifth phase is audited (Ntsaluba: 2026). The state is cutting back a model with demonstrated potential just as new technology could make it more effective.

In Edo State, Nigeria, six weeks of after-school tutoring with an AI assistant under teacher guidance raised test scores by 0.31 standard deviations (De Simone et al.: 2025). In the trial presented in Figure 1, an AI assistant helped lower-rated tutors most, for about US\$20 per tutor a year (Wang et al.: 2024). A young BEEI assistant is just such an inexperienced tutor. A permanent, AI-assisted reading corps of 100,000 assistants, each working with about 30 learners in Grades 1 to 4, could reach three million children for about R1,400 each a year (Table 2).

4.3 Money that follows the learner

After learners complete school, the main problem in skills development is how training funds are allocated, not how much money is available. Employers are reluctant to pay for skills that workers can take to a competitor. In the US, moving from no enforcement of non-compete agreements, which restrict workers from joining rivals, to average enforcement is associated with 14% more firm-sponsored training (Starr: 2019). Where workers cannot afford training themselves, the result is underinvestment that justifies public co-funding. One answer is an individual learning account: a personal training budget that belongs to the worker and stays with them when they change jobs (OECD: 2019). Singapore, for example, gave citizens aged 40 and above a S\$4,000 training credit in 2024 for about 7,000 courses with better employment outcomes (Ministry of Education Singapore: 2024). A South African account of R5,000 for 400,000 young and displaced workers a year would cost R2 billion, about 5% of the SETA and NSF reserves.

5. Redesigning industrial policy

5.1 From factories to services

South African industrial policy remains centred on manufacturing, but manufacturing employment fell by 100,000 in the year to mid-2026 (Stats SA: 2026a). Developing countries are deindustrialising at ever lower income levels (Rodrik: 2016), while tradable, knowledge-intensive services can now offer the scale and spillovers that factories once did (Nayyar et al.: 2021). AI strengthens this case by lowering the expertise needed to export services. The binding constraint is diffusion, because new technologies spread slowly from leading firms to the rest (Andrews et al.: 2016).

5.2 Paying for upgrading, not headcount

Under its 2021 design, the GBS incentive paid R134,000 over five years for each non-complex job and R280,000 for a highly complex one (Deloitte: 2021). It rewards the number of jobs rather than their quality. The Department of Trade, Industry and Competition (dtic) paid more than R808 million in GBS incentives in 2024/25 (KZN Industrial News: 2025). Using 30% of that budget as a top-up for each worker who moves from routine to complex work, verified by a wage increase, would reward operators for moving agents into more skilled, better-paid roles rather than out of their jobs.

5.3 Demand and diffusion

Because AI can reduce the labour that firms need (Korinek and Stiglitz: 2021), public procurement should steer it towards tools that support workers. In 15 primary-care clinics in Nairobi, Kenya, clinicians using an AI decision-support tool made 16% fewer diagnostic errors and 13% fewer treatment errors across nearly 40,000 patient visits (Korom et al.: 2025). Earmarking R500 million a year for such tools, about 0.6% of the R89.2 billion that health departments spend on goods and services (National Treasury: 2026), would create a home market for tools that support nurses and clinicians rather than replace them. For small firms, an AI extension service, modelled on agricultural extension officers who advise farmers, could offer co-funded R25,000 vouchers for advisers who help a panel-beater or pharmacy adopt new tools. US manufacturing extension services are linked to faster productivity growth among their smallest clients (Lipscomb et al.: 2018).

6. Redesigning fiscal incentives

6.1 The tax bias against labour

In the US, labour faces effective tax rates of 25.5% to 33.5%, while equipment and software have faced about 5% since the 2017 tax reforms, so automation goes further than is efficient (Acemoglu et al.: 2020). South African estimates are limited, but the components suggest a similar bias. Larger employers pay a 1% Skills Development Levy and all employers a 1% UIF contribution, while new manufacturing plant can be written off over four years under section 12C of the Income Tax Act (South Africa: 1962, 1999, 2002). A payroll levy whose proceeds go unspent acts as a tax on hiring.

6.2 Four corrective instruments

Four instruments could reduce the bias against labour without taxing technology. The first is a “train rather than retrench” allowance. Section 12H gives employers an annual allowance of R40,000 per learner at National Qualifications Framework (NQF) levels 1 to 6, but only for SETA-registered learnerships concluded before 1 April 2027 (SARS: 2025). Extending and widening it to accredited short courses would reward firms that retrain workers for AI-supported roles. The second is a revived Training Layoff Scheme, which pays workers facing retrenchment an allowance while they retrain. In 2014/15 it reached only 14 companies and about 2,100 workers, because firms were reluctant to open

their books, unions did little to promote it and the process was bureaucratic (PMG: 2015). Making the UIF the sole paying agent with a 30-day decision rule would address these failures, while employer co-payment would deter abuse.

The third is a refocused Employment Tax Incentive (ETI), which subsidises the hiring of young workers. It cost almost R4.8 billion in 2022/23, but studies find little effect on youth employment, partly because it is too small to change labour costs much (Ranchhod and Finn: 2016; Donaldson: 2026). Focusing this budget on first jobs would make it larger where the market failure lies. A first job creates experience from which later employers benefit without paying for it, so its social return exceeds its private return. AI could widen that gap by removing entry-level tasks.

The fourth is an early warning for the tax base. The Fiscal Risk Statement, published with the Medium Term Budget Policy Statement, already assesses risks such as government guarantees to state-owned companies (National Treasury: 2026). A section tracking PIT paid by young taxpayers and desk-based occupations would show whether AI is eroding the PIT base in time for policy to respond.

Table 2 below estimates the annual cost and funding source of each option.

Table 2: Illustrative cost of the redesign options (annual, R billion)

Measure	Assumption	Gross cost	Funding source
AI-assisted reading corps	$100,000 \times (10 \times R4,000 + R1,000 \text{ for tools})$	4.10	UIF
Learning accounts	$400,000 \times R5,000$	2.00	SETA and NSF reserves
Section 12H extension	$25,000 \text{ workers} \times R40,000 \times 27\% \text{ tax rate}$	0.27	New revenue forgone
Training Layoff Scheme	$20,000 \times (6 \times R6,000 + R15,000 \text{ training})$	1.02	UIF
GBS upgrading top-ups	R808m budget, 30% as top-ups	0.81	dtic budget
ETI for first jobs	2022/23 claims	4.80	ETI budget
Health AI procurement	Fixed allocation	0.50	Health budget
Extension vouchers	$20,000 \text{ firms} \times R25,000$	0.50	NSF
Total		14.00	

Source: Own calculation (Ntsaluba: 2026; SARS: 2025; KZN Industrial News: 2025; Donaldson: 2026; National Treasury: 2026)

Table 2 shows that the options would cost R14.0 billion a year, almost all repurposed from existing budgets and reserves. Using reserves raises consolidated spending, but the only new main-budget cost is R0.27 billion of revenue forgone on section 12H, or 0.06% of debt-service costs.

7. Conclusion

This essay set out to establish how South Africa should redesign education, industrial policy and fiscal incentives so that AI raises productivity growth while limiting disruption in the labour market. Using the literature, QLFS data and Budget Review data, it found that AI helps inexperienced workers most but threatens the entry-level jobs in which they learn. South Africa is exposed on three fronts: weak

literacy limits who can use AI; industrial incentives reward the number of jobs rather than their quality; the tax system favours machines over workers. Most of the money needed to correct these settings already exists, so the binding constraint is state capacity.

8. Recommendations

In my view, South Africa should treat AI as a reason to invest in its youth rather than a threat to be managed after the damage is done. My main recommendation is to turn the BEEI into a permanent, UIF-funded reading programme in which assistants, supported by AI tutoring tools, work with small groups of Grade 1 to 4 learners. This would raise literacy while employing young adults.

I would move some of the unspent SETA and NSF reserves into learning accounts and pay the GBS incentive for upgrading, not headcount. Health departments should buy AI tools that support nurses and clinicians, while an extension service helps small firms adopt them. I also recommend extending section 12H, reviving the Training Layoff Scheme, focusing the ETI on first jobs and adding a tax-base section to the Fiscal Risk Statement. The 12H extension, the ETI refocus and the first reading assistants could start in the 2027 Budget, followed by the rest once delivery systems are tested.

I believe this package is workable. Almost all of its R14.0 billion cost is already in the system, because each measure builds on an existing programme, fund or tax provision. Its weakest point is state capacity, so the package routes money through individuals and single paying agents, pays for verifiable results and starts small enough to evaluate.

Young clerks and contact-centre agents are the canaries of South Africa. Miners who saw the bird falter cleared the air first. The 2027 Budget should do the same before the singing stops.

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