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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1.1Introduction

The advancements in technology bring about a dual impact it can create jobs and lead to job loss at the same time, automation brings about displacement in traditional jobs in the sectors such as manufacturing and agriculture increasing concerns about jobs losses (Mokofe, 2024).For us to understand the dynamic relationship we must firstly be able to define the core concepts that form part of the relationship firstly AI is the machine learning device that can do tasks that would normally require human intelligence (Floridi and Cowls, 2019).Education is known as the process of absorbing knowledge, skills, and values that allow for a person to give meaningful impact to society and to build successful professionals (Devadze, Gechbaia and Gvarishvili, 2022).Industrial policy is better known as the policies that are implemented to rejuvenate the stagnant economic growth of South Africa, develop industries since competitiveness in industries increases the GDP of a country. Fiscal incentive differ from industrial policies since fiscal incentive are the financial benefits given by public government to industry stakeholders that support the NDP goals.

1.2Problem statement

The central issue is that South Africa is in a paradox as it enters the dawn of the AI, the official unemployment rate in the country is 33,6%, with youth unemployment being over 47% ages between 15-34 the new era is the one needed to create jobs and bring productivity gains but at the same time it can further increase the unemployment rate (Statistics South Africa, 2026).The rate at which AI is bringing about change in the labour markets through automation which leads to job losses, is restructuring employment creating more technical jobs such as data analysts who analyse data, also in agriculture soil technicians assessing soil quality (Ali, 2025).Accompanied by slow growth in the economy of the country and a decline in the labour supply leading to an increase in unemployment, this goes to show that without new innovative tools such as AI for productivity gains the country will not grow economically (Manyika and Spence, 2023).This literature poses a key argument as to whether South Africa should adopt an integrated augmented approach towards AI a strategy to curb exclusion in the labour market, using AI to work with workers rather than replacing them. Also argues that there should be a redesign of education, industrial policy, and fiscal incentives.

1.3Outline of the essay

This essay will cover the current education system and how it can be redesigned.It will also cover the role of industrial policy and the 3 main sectors in South Africa which create the most jobs and how industrial policy can harness AI.another factor that will be covered are fiscal incentives current problems and how they can be adopted to suit AI.Lastly we will evaluate the impact of AI in the labour market then conclude.

2Education System in SA

2.1Current challenges

Education system in South Africa faces a big problem based on the performances in international assessments recent results from the Progress in International Reading Literacy Study 2021 showed that majority of grade 4 students in South Africa could not read for understanding (Saal et al., 2025). Moreover in South Africa there is no cohesiveness in the framework of the educational system and lack of policies that promote and guide how AI should be adopted between TVET insituitions with collaboration with SETA. With programs such as WeThinkCode, Amazon Web Services training academy, SETA-driven pilot programs they should be integrated with the TVET curricula to produce experimental learning opportunities this will ensure alignment between AI training and real world application (Maseko and Ngubane, 2026). In comparison Japan incorporates industry and business partnered education system producing AI capable industrial technicians through strong foundational education and STEAM programs which makes the educational system to produce AI technicians of the highest quality since they know and can operate AI tools(Yamada, 2021). The gap of integrating AI in education will continue due to the educators training deficits, and a lack of institutional supports (Stylianou and Vrasidas, 2025).

2.2Importance of education

The main importance of education is to create a society which has people who are able to make responsible choices and think on their own encourages responsibility (Biesta, 2022).Higher education in South Africa often comprising of TVET colleges and universities have made sure that sustainability happens learning how the institutions teach how world operates changes how society and students think bringing about solution that will yield sustainable growth (Žalėnienė and Pereira, 2021).The reason why people may be educated is to get higher paying jobs since education often incentives since education has a positive relation with income the more educated a person is the higher they will be incentivise get a higher income (Piao and Managi, 2023).

2.3Role of AI: How AI can be harnessed to promote education and increase productivity.

The new age is one in which the fourth industrial revolution is here to stay whether we like it or not, AI is incorporated in the education system in many ways in South Africa TVET colleges and universities must integrate curriculum programs which equips students on the new jobs created by AI to bring about credible technicians.AI is practically making it easier for students to learn at the university of Fort Hare they use blackboard learning tool which also helps student who live far can bridge distant learning gap, students vary in terms of how they learn and grasp information tailored to meet the students need AI provides an adaptive learning system tailored to the students needs (Shoukat, 2024).For efficient use of AI it is very logical that one knows how to operate and use AI tutoring systems of AI offer a one on one customised learning

experience to adjust to the leaner. In big corporations the main issue is often administration which is sometimes slow decreasing the efficiency the education would perform at AI makes administrative task easier and quicker marking and grading papers quicker (Bouchareb & Ghedir, 2024).

2.4How to redesign education system

The proposal redesign which proposes that for South Africa education system to be the driver of higher human capital what it needs is to integrate all phases of education from foundation through to TVET colleges with SETA programs. Firstly the process starts with the first step foundational education phase where initial development starts to take shape this educational phase should make it a priority that literacy, numeracy, critical thinking with the indigenous knowledge are able to bring about the required capabilities to be able to understand advanced technological learning (Ngubane and Makua, 2021). As leaners continue learning going into the next phase now the second priority should be to strengthen their problem solving skills and whereby you start to now develop the basic digital skills needed, this will prepare them for AI, coding ,robotics in grades 10-12. Following this phase higher education institutions and TVET colleges should be able to provide skills based and industry aligned training and be in partnerships with businesses like Japan, also SETA programes and private and public programmes such as WeThinkCode, and Amazon Web Services. This will enable graduate to transfer the theory base learning into practical use allowing these new to the labour market to operate and manage these AI driven tools within the industrial sector. Teacher development is crucial and providing tools necessary to be able to teach these subjects. Without policy integration between trade, higher education, industry stakeholders the implementation will not succeed (Stylianou and Vrasidas, 2025).

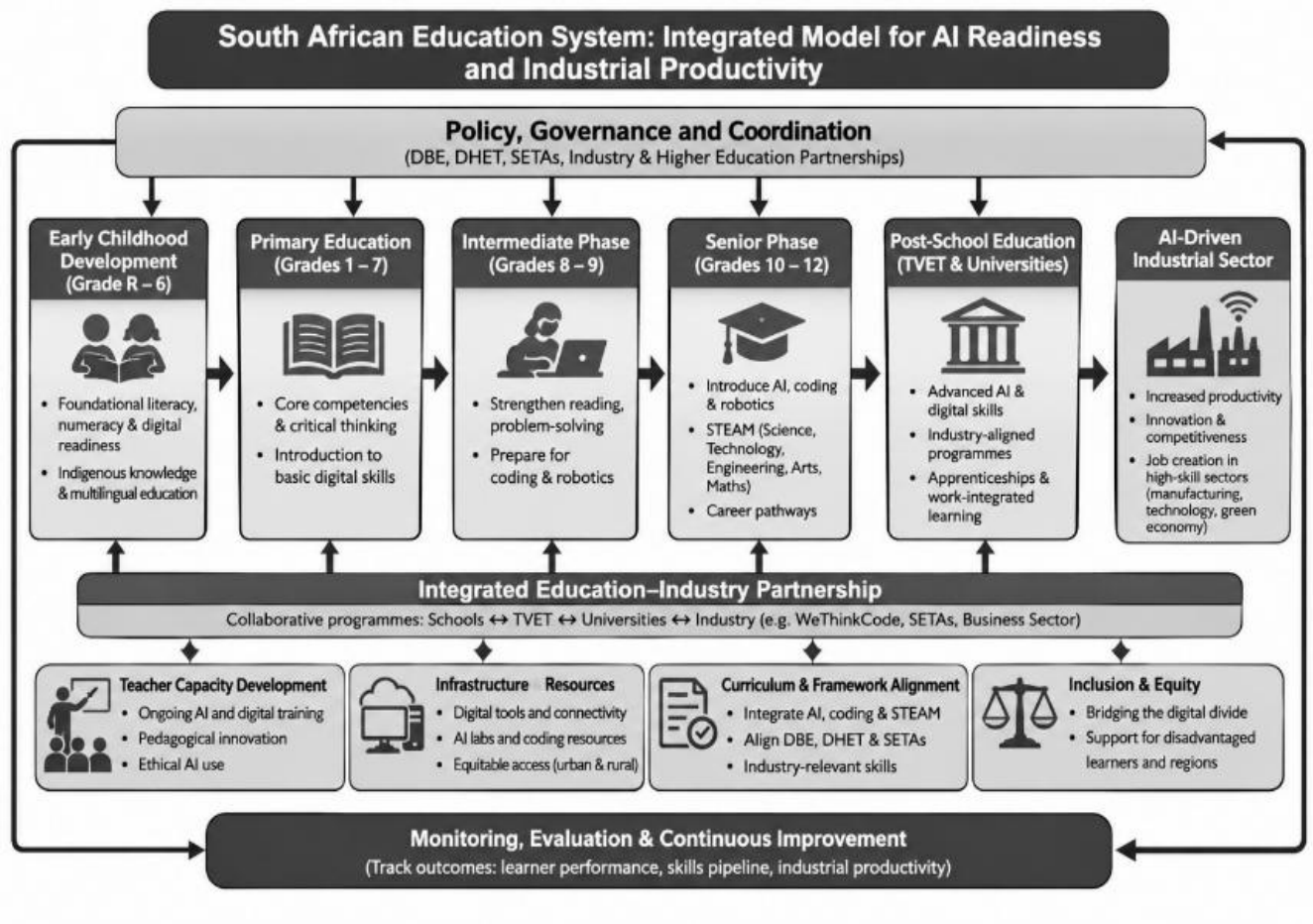


Table2.1(Education system redesign)

The main point that can be taken from the mechanism is that investing in foundation phase is supposed to be followed by progressive learning of technologies of AI in partnership with TVET colleges and industry stakeholders can help progress South African technical abilities and quality of the labour force produced. Educational reform depends on the integration of educational phases and coming to an understanding without cohesion and alignment the redesigned educational system will not work at all to bring about productivity gains and employment on top credible technicians who can be able to operate and understand AI resources.

3.INDUSTRIAL POLICY

3.1ROLE OF INDUSTRIAL POLICY

From the early development of the industrial era in the past regimes from Europe to Africa it has been a cornerstone known to have built society the industrial sector gave birth to new sectors it is the pillar in which a country's economy is built around even the most elite nations in the world have come to understand that the manufacturing sector produces the most jobs such as Asia has become known as the manufacturing hub of the world. It's imperative that an

industrial policy is often effective instrument used to shape economic activity the main concern shouldn't be whether the public government should make use of the industrial policy rather how the policy is designed and how it is implemented. On the role of industrial policy it offers transformation on the structure of economic activity, to provide stimulus for jobs creation, acts as a catalyst for innovation also fosters infant industries (Juhász *et al.*, 2024). Disadvantage of subsidies they can discourage competitiveness so to minimise the danger government uses subsidies to fix economy wide issues such as knowledge spillovers also to rejuvenate industries facing market failures (Criscuolo *et al.*, 2022).

3.2 current industrial policy in the context of AI adoption.

The main question is where does South Africa stand in industrialisation in the new age of artificial intelligence. Main concerns that arise is that the industrial sector has a slow technological uptake in an age where artificial intelligence is growing in a rapid fast paced digital era, this further expands on that to fuel industrial economy you need better robust policies and stakeholder engagements (Jansen van Rensburg et al., 2021). Study by Pedota, Grilli and Piscitello (2023) shows that adopting approaches to promote adoption of AI in the industry is often associated with a strong upskilling of employees. In Pakistan the industrial sector is often dependent on foreign technologies they are not innovative, this further shows that adoption of AI without regulations can pose risk thus government intervention is a solution. In South Africa there is lack of regulations on AI adoption no policy to regulate AI use which often leads to job displacement. Marx and Braverman argue that through the advancement of technology is able to bring about low costs in labour expenses, also automation increases productivity efficiency which often leads to labour displacement, this just goes to show that digitalisation should be taken as one of the pillars in the industrial policy and not exclude it to be a lone sector as digitalisation is in effect in all sectors.

3.3Prioritise 3 sectors: Mining, Manufacturing, Agro-processing

For growth in the manufacturing industry it is important we improve the infrastructure and the country will yield great results if it focuses on industries that offer hire most of the labour force mining industry, manufacturing industry and agricultural industry (Alexander, 2021). The first priority industry should be manufacturing sector in the automobile industry considering it has been the most successful and most important industry over the years .On the African continent South Africa is known as the manufacturing hub of cars with the Mercedes Benz plant in the eastern cape being the heartbeat of the Eastern Cape province employing the most people in the automobile sector, Mercedes Benz plant being only 1 of the few to produce hybrid cars showing the advanced investment in the sector. Modern trend shows that electric vehicles are taking over the market South Africa should invest in building more electric cars this shows that the country

needs diversification, decarbonisation, digitilisation the 3 pillars tapping into the market of EV cars will generate economic growth and more jobs.

Second priority mining industry often with the most abundant natural resources in the world South Africa is rich in minerals. Changes in geopolitics often encourage African nations to move past exporting raw materials to taking up a role to creating value through refining and creating final products themselves instead o being suppliers of raw materials,followed by regional coordination between countries to foster economic growth (Müller, 2023).

Third priority is agricultural industry South Africa has fertile irrigation ground especially in the eastern cape province. The industrial policy in the sector often recognises entrepreneurship as a key to job creating but moving beyond entrepreneurship the policy should be broadened to cater to different youth knowledge and their skills (Geza et al., 2022). Diversification of crops is another policy which aims to decrease reliance on import substitution which will promote local economy (Amelework et al., 2021).

3.4How industrial policy should harness AI in mining,agricultural,manufacturing sector

Each industry differs in how they harness AI in each sector based on the requirements posed by each sector. In the agricultural sector the policy should be able to fund disease detection AI tools since many crops face pesticide being able to use AI to detect diseases will help save crop and increase crop yield, policies should encourage government spending in rural areas infrastructure development for connectivity (Mhlanga, 2021).In the mining sector to integrate AI underground have to fund underground Wi-Fi so that they can be able to gather data ,also the policy can fund data analyst skills (Lorenz and Kraemer-Mbula, 2021).In the manufacturing sector policy should incorporate a skills pipeline for more TVET graduates to be hired, also promote skills alignment with AI augmentation of AI.

4.Fiscal incentive/policy

4.1What are fiscal incentives?

Fiscal incentives are the government benefits that encourage business, firms that propel more investment by creating benefits that will yield more profits for firms. Second are also tax breaks which offers companies to pay less on their tax. Subsdies the government pays a portion of the cost to make producing goods cheaper to increase productivity lower cost of expenses. Government grants offer money to fund government programs that will yield economic growth.

4.2 Current problems with fiscal incentives

The issues that come with fiscal incentives that offer capital allowances and equipment subsidies these often compensate firms for buying machinery although those machinery are the very same ones that displaces workers causing job losses. This often discourages the fiscal

incentives that does not regard the perspective that undermines job retention, especially in industries that are labour intensive (Mwakanema, 2023).Even though the study of Wasara (2021) argues also administrative issues and inefficiencies may often lead to corruption and misallocation of resources.

4.3How to redesign them

Fiscal incentives even though benefits aim to increase productivity yield it is important to note we are moving into a digital era which has AI at the center. The incentives should be given to companies that retain jobs they should be given more incentive so that the firms can expand and higher more human capital is hired since more technical new jobs will be created for AI technicians such as data analyst drone operators. Since South African industries are still in its infancy stage there are SMMES also that have to be competitive also they should be given incentives to level the field this will create industry competitiveness and not create monopolistic industries .Also not forgetting the education sector there should be incentives for industries that fund TVET training which will create alignment between education and industry stakeholders.

5. Labour Market & Disruptions

AI automates tasks often done by the human labour often now decreasing the value of human capital in the finished product since the machinery does all the work. The disadvantage of AI is that it often creates more inequality knowing the current inequality in South Africa is over 0.5% amongst the highest in the world due to apartheid legacies and slow economic growth, thus inequality is further increased between society AI will likely favor higher earners. Since AI bring about new task for human capital now the firms and industries are tasked with reskilling the labour force.AI automation decreases value of labour force leading to retrenchment since new AI tool are more efficient don't have human error leads to productivity gains.

6. Conclusion

Based on the literature l studied for this essay and the current state of South Africa in adopting AI what has been clear is that AI hasn't been conclusively proven to create jobs however it has created technical jobs, the gains of AI hasn't translated in economic growth gains. The gap between South Africa and leading countries is still vast with 80% of grade 4 leaners unable to read to understand this will be an issue in teaching about AI, the structure of the education system is supposed to be aligned with also industry stakeholder that way we are able to create credible technicians who are able to translate their theory knowledge and digital skills in the market. Industrial policies should be broadened to promote economic growth in the 3 main sectors mining, agricultural, and manufacturing sector. Fiscal policy should incentive companies that use AI more thus retaining jobs, and companies which fund TVET programs. Even though there has been no conclusive evidence to support that AI will create more jobs besides technical

jobs it is important to not rather than singling out AI as its own sector we should work with AI creating augmentation where AI would do 30% of the work and the end user being the worker thus increasing worker value. This also requires integration of education system with fiscal incentives and industrial policy to regulate AI to bring about more jobs in the economy.

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