EDUCATION FOUNDATIONS OF THE DEVELOPMENT OF SKILLS AND PRODUCTIVE CAPABILITIES

By: Suleman Sumra and Joviter Katabaro

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51Uporoto Street (Off Ali Hassan Mwinyi Road),
Ursino Estate • P.O. Box 31226, Dar es Salaam, Tanzania.
Tel: (+255) 22 2760260, 2760751/52,
Mobile: (+255) 754 280133 • Fax: (+255) 22 2760062,
Email: esrf@esrf.or.tz • Website: www.esrftz.org

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LIST OF ACRONYMS

ADB	African Development Bank
ACSEE	Advanced Certificate of Secondary Education Examinations
ALAF	Aluminium Africa
ATE	Association of Tanzanian Employers
CSEE	Certificate of Secondary Education Examination
EGMA	Early Grade Mathematics Assessment
EGRA	Early Grade Reading Assessment
EOI	Export-Oriented Industrialisation
EPZs	Export-Processing Zones
EQUIP T	Educational Quality Improvement Programme in Tanzania
ETP	Education and Training Policy
FBO	Faith-Based Organisations
FDCs	Folk Development Colleges
FGD	Focus Group Discussion
FYDP	Five-Year Development Plan
GDP	Gross Domestic Product
GEMR	Global Education Monitoring Report
GPA	Grade Point Average
HAT	Hotels Association of Tanzania
ICT	Information Communication Technology
IIDS	Integrated Industrial Development Strategy
IIEP	International Institute for Educational Planning
ILO	International Labour Organisation
ISI	Import-Substitution Industrialisation
IT	Information Technology
ITE	Institute of Technical Education
LTTP	Long-Term Perspective Plan
MCDWAC	Ministry of Community Development, Women Affairs and Children
MEST	Ministry of Education, Science and Technology
MKUKUTA	Mkakati wa Kukuza Uchumi na Kupunguza Umaskini
MMIC	Model Medium Income Country
MOEC	Ministry of Education and Culture

MOEVT	Ministry of Education and Vocational Training
MVA	Manufacturing Value Added
NACTE	National Council for Technical Education
NBS	National Bureau of Statistics
NCT	National College of Tourism
NECTA	National Examinations Council Tanzania
NICs	Newly Industrialised Countries
NSGD	National Strategy for Gender Development
NSGRP	National Strategy for Growth and Reduction of Poverty
PEDP	Primary Education Development Plan
PPP	Public–Private Partnership
PPTC	Post-Primary Technical Centre
PSLE	Primary-School Leaving Examinations
R&D	Research and Development
SACMEQ	Southern and Eastern Africa Consortium for Monitoring Educational Quality
SAP	Structural Adjustment Programme
SDGs	Sustainable Development Goals
SDL	Skills Development Levy
SEDP	Secondary Education Development Programme
SESS	Science Education in Secondary Schools
SEZ	Special Economic Zone
SIDP	Sustainable Industrial Development Policy
SME	Small and Medium Enterprises
SSME	Snapshot of School Management Effectiveness
STEM	Science, Technology, Engineering and Math
STIP	Science Teacher Improvement Programme
TADREG	Tanzania Development Research Group
TCT	Tourism Confederation of Tanzania
TCU	Tanzania Commission for Universities
TDV 2025	Tanzania Development Vision 2025
TDMS	The Teacher Development and Management Strategy
TNBC	Tanzania National Business Council
TPSF	Tanzania Private Sector Foundation
TVET	Technical and Vocational Education Training
UN	United Nations
UNDAP	United Nations Development Assistance Programme

UNDP	United Nations Development Programme
UNESCO	United Nations Educational Scientific and Cultural Organisation
UNIDO	United Nations Industrial Development Organisation
UPE	Universal Primary Education
URT	United Republic of Tanzania
USAID	United States Agency for international Development
UTS	Unified Teacher Services
VET	Vocational Education and Training
VETA	Vocational Education and Training Authority
VITB	Vocational and Industrial Training Board

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ABSTRACT

Tanzania has committed to becoming a middle income country by 2025, as envisaged in Tanzania Vision 2025, through industrialisation. Prior to colonisation Tanzania had developed nascent industries in such areas as textiles, iron smelting, farming tools, pottery and furniture making. Through apprenticeship, people gained the skills necessary for producing goods that the societies at the time required. Colonialism brought an end to production of various items in the country through importation of cheap goods. Industrial development in the post-colonial period has a chequered history. Rapid expansion in the early years of independence was halted by various factors, both internal and external. In recent years industrial production has picked up again.

One factor which holds back industrialisation in the country is education. The education sector is not producing a sufficient number of people with the required skills. Although the government has invested heavily in education over the years, the quality of education has remained poor. In order to become a middle income country, it is estimated that Tanzania will require more than 250,000 graduates with a science background. Yet the performance of students in science subjects is poor. Only between 15 to 20% of those who sit for the national secondary education exam (CSEE) pass in mathematics. As math is the backbone of science education, this limits the pool of students available for training in scientific fields. In 2013/2014, only 25.8% of university students were taking science-related courses, compared to 34.0% of university students in 2006/2007 who were in science-related courses. This mismatch between what the industries need in terms of employee skills and what our educational institutions produce is the big hurdle that the nation must address if it is to become a middle income country by 2025.

Korea and Singapore provide examples of what needs to be done for a country to produce the workforce required for industrialisation. Both countries focused on building an egalitarian, quality education system that matches the best in the world. These countries also focused on building excellent technical educational institutions, which produced the required manpower for industrial development.

The study proposes that in order to improve the quality of education, we should focus on teachers. It is important to get the right people in the profession, people who are competent and motivated. Teachers also need to be held accountable. The study also proposes the introduction of STEM education into primary schools. As STEM will be related to the life that children live, it is likely to create students who think critically and have problem-solving skills.

INTRODUCTION

For Tanzania to become a middle income country, as envisaged in Tanzania Vision 2025, it will have to significantly increase the GDP growth rate. For this to happen, Tanzania will have to industrialise rapidly. Industrialisation has, historically speaking, proven to be the only way to escape the global periphery and sustain high levels of economic development. There are many pre-requisites to achieve industrialisation, but for the purpose of this paper our focus will be on the role of education in developing the workforce skills needed to make rapid industrialisation a reality.

In recent years most governments, especially those in developing countries, have been focusing their attention on skills development to increase the employability of school graduates. All young people, wherever they live and whatever their background, require skills that prepare them for decent jobs so that they can thrive and participate fully in society. Skills are developed in schools, from basic skills in the early years of schooling to more complex skills at higher levels. Research has shown that access to quality education, education that provides skills and knowledge needed for employment, is not universal. Children of the rich, who usually live in urban areas and have educated parents, have access to better-quality schools than children of the less well-off, who often live in rural areas and have uneducated parents. Children who access better schools end up having better skills and knowledge and thus secure higher-paying jobs. The level of education one receives is leveraged by the socioeconomic status of parents. This depends largely on the social policies in education that are being implemented.

In many countries, including Tanzania, the youth population is increasing at a fast pace. This large youth population can be seen as an asset, an engine for growth and development, the so-called demographic dividend. However, in many developing countries young people are not adequately prepared for this role, especially women and those from rural and underprivileged households. In recent years, international focus has been on sustainable development and employment. Goal 8 of the Sustainable Development Goals (SDGs) requires states to promote inclusive and sustainable economic growth, employment and decent work for all**. Target 8.5** requires all countries to achieve full and productive employment and decent work for all men and women, including for young people and persons with disabilities, and equal pay for work of equal value, by 2030 (United Nations, n.d.).

SDGs have placed skills development at the centre of the education debate. SDG 4 requires countries to ensure inclusive and quality education for all and to promote lifelong learning. Target 4.4 calls for them to "by 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship". To ensure that youth secure decent employment, education systems have to ensure that school graduates acquire the required skills. Three kinds of skills are essential for youth to be engaged productively; these are foundation skills, transferable skills and vocational and technical skills. We will briefly discuss what these skills are.

Foundation skills are the literacy and numeracy skills necessary for securing employment. These skills are normally developed in the early years of schooling, and without these foundation skills employment, except perhaps manual labour, is impossible to secure. For those who cannot read or write or master basic arithmetic the possibility of gainful employment is low. These foundation skills are also necessary to access further education. This is why it is important for children to finish primary education and for the state to ensure that quality basic education is provided to all, irrespective of their gender, residence and physical attributes. Basic education therefore focuses on imparting broad knowledge, basic skills and values. It is also important for the state to provide a second opportunity, for those who miss out on full primary education, to attain the foundation skills.

Transferable skills are those skills that can be adapted to different work needs in different environments. They include skills related to analysing and solving problems; communication, such as writing reports and memos; creativity; leadership; and entrepreneurship. These skills are developed partly through appropriate education and also outside the school environment. On-the-job training can be used to develop these skills.

The third set of required skills includes *vocational and technical skills*. Many jobs require specific technical know-how such as carpentry, masonry, tailoring, bricklaying, mineral and gas exploration and adding value to raw materials. Vocational training institutions provide training in building these skills. Information Communication Technology (ICT) skills are becoming increasingly important in most jobs. Most secondary schools provide ICT skills to students as well.

Another skill set frequently mentioned in Tanzanian literature is *behavioural skills*. A study by Sabarwal (2014, 17), found that when asked what skills were extremely hard to find in Tanzania, 34% of the firms surveyed cited behavioural skills, 30% cited inter-personal skills and 28% cited job-specific technical skills. Where are these behavioural skills developed? Behaviours such as honesty, punctuality, time management, hard work and trustworthiness are partly developed in schools and partly through on-the-job training.

National Development Policies and Strategies

Tanzanian development is guided by several policies and strategies. Perhaps the most important one is the Tanzania Development Vision 2025 (TDV) that was launched in 1999 and set the goals for attaining high-quality livelihoods by 2025 (URT, 2000). The Vision outlines a plan for the country to become a middle income country by the year 2025. Briefly, the plan includes the following:

National Strategy for Growth and Reduction of Poverty I & II (MKUKUTA)

As an interim measure to implement the TDV 2025, the government launched the National Strategy for Growth and Reduction of Poverty I (NSGRP I) in 2005 (URT, 2005) and II in 2010 (URT, 2010a). The strategy was aimed at enhancing economic growth and reducing poverty. NSGRP II was meant to redress some of the shortfall observed in NSGRP I. The review of both NSGRP I & II showed some success across the sectors. In education some of the achievements attained include increased enrolment in primary and secondary schools.

The Tanzania Long-Term Perspective Plan (LTPP) - 2011/12–2025/26

The Long-Term Perspective Plan (LTPP) was initiated as a road map to becoming a middle income country (URT, 2012). The LTPP is to be implemented in a sequence of three Five-Year Development Plans (First FYDP (2011/12-2015/16*): Unleashing the Growth Potential,* Second FYDP (2016/17-2020/21): *Nurturing an Industrial Economy* and Third FYDP (2021/22-2025/26): *Realizing Competitiveness-Led Export Growth*). The LTTP sets a strategic direction for the realisation of the Vision by forming a link between the long-term Vision and the country's medium- and short-term perspectives. The Vision has five multi-dimensional development goals, namely, social and economic progress, political development, institutional development, technological development and environmental sustainability. It has been argued that

The centrepiece to the realisation of TDV 2025 is having a solid foundation for a competitive, dynamic and highly productive economy, manifested in, and accompanied by, five main attributes, namely: high quality livelihoods; peace, stability and national unity; good governance; a well-educated and learning society; and a competitive economy capable of producing sustainable and shared growth (URT, 2012, 5).

The TLPP recognises education as a crucial component for national development through creation of the high-quality human capital necessary for improved productivity and therefore enhancement economic growth. The road map has identified broad policies, guiding principles and specific objectives and targets to be realised along the way to 2025 (URT, 2012, 83–84). Broad objectives to be achieved are:

- Increased access and promotion of equity at all levels of education and training;
- Bridging the skills gap to ensure that the lack of skilled labour does not remain a binding constraint to economic growth;
- Increasing the proportion of the population with high qualifications to 12%, and the proportion with medium qualifications to 34% by 2025; and
- Raising retention rates at all levels of education.

Tanzanian Education and Training Policies (1995 & 2014)

Tanzania launched the Education and Training Policy (ETP) in 1995 (URT, 1995). The aspiration for an ETP was to "guide, synchronize and harmonize all structures, plans and practices; to ensure access, equity and quality at all levels; as well as proper and efficient mechanisms for management, administration and financing of education and training" (URT, 1995, xiv). The implementation of the policy led to the development of the Primary Education Development Plan (PEDP) I, II and III (URT, 2001; 2006; 2012b), the Secondary Education Development Plan (SEDP) I-II (URT, 2004a; 2010), the Teacher Development and Management System (TDMS) (URT, 2007), and other related activities that saw significant achievement in the sector, particularly in terms of expansion of education provision at all levels and the subsequent near achievement of Goal 2 of the UN's Millennium Development Goals (MDGs). ETP 1995 was succeeded by ETP 2014 (URT, 2014c) which builds on the

successes and addresses the shortfalls of ETP 1995.

Organisation of Report

This document has five sections:

Section 1: In the first chapter we discuss the industrialisation process in Tanzania and the capabilities and skills needed for industrialisation to proceed.

Section 2: In this chapter we discuss how well the education sector is meeting the demands for skilled labour.

Section 3: In this chapter we discuss key lessons that can be learnt from the experiences of countries that achieved rapid industrialisation.

Section 4: In this chapter, we discuss how to bridge the gap in skills and productive capacities and point to the need for reorienting social policies in education.

Section 5: This chapter will provide our conclusions and recommendations.

1. INDUSTRIALISATION IN TANZANIA

1.1 Industrial Development Policies and Strategies

Industrial development in Tanzania since 2000 has been guided by the Sustainable Industrial Development Policy (SIDP) – 1996–2020 (URT, 1996). The main aim of SIDP was to accomplish the decision of the government to withdraw from direct investment in productive activities, and encourage the private sector to become the main driver of the economy. To achieve these policy objectives, SIDP was to be implemented in three phases (Mussa, 2014, 9). The focus of the first phase, implemented between 1996 and 2000, was to rehabilitate and consolidate the existing industrial capacities through restructuring. During the period a sustainable environment for industrial development was to be put in place. Given the comparative advantage that Tanzania possesses, the agro-processing industry was to be prioritised. Export-processing zones (EPZs) were to be established during the medium-term priority programme, to be implemented between 2000 and 2010. As a long-term strategy, investment was to be initiated in basic capital goods, and full use made of the rich mineral resources that Tanzania is endowed with.

1.2 Industrial Development in Tanzania

Eurocentric histories of Tanzania would have us believe that development came as a result of colonialism, making no mention of the production and sale of large number of goods that took place prior to colonisation. The skills to produce goods were dynamic, and were continually influenced by internal creativity and experimentation as well as by contact with external systems (Flavier et al., 1995, 479). Colonialism halted the development of local production and skill creation almost abruptly. Importation of cheap goods led to death of local production in areas such as clothing, farm implements and hunting tools. Without external interventions normal development would have resulted in careful amalgamation of indigenous and foreign technologies, leaving the choice, the rate and degree of adoption and adaptation to the clients.

Need for production of various goods was created by local situations. For example, the rivalry between certain rulers among the Chagga led to more attention being paid to military organisation and the production of weapons. In the nineteenth century, blacksmiths in Mamba in Kilimanjaro came to specialise in large-scale production of weapons. In order to satisfy this demand, the Chagga blacksmiths went to the Pare Mountains to buy products of the smelters working on the ore extruded from the mountains (Kimambo, 1968, 26). Markets on the Pare Mountains also saw Maasai coming to purchase smelted iron for making spears.

The Pare region, apart from being important source of smelted iron, was also an important source of finished iron products. The smelting of iron and making of tools was clan-based. The Wafinanga specialised in iron smelting, and the Washana in the making of iron tools like hoes and machetes. Towards the end of the nineteenth century European iron and

steel became gradually available, putting the Wafinanga out of business since iron and steel could be heated and turned into implements without smelting. The Washana kept on making iron tools but were also slowly phased out due to the importation of metal products from Europe (Maghimbi, 1994). The Ugweno iron works produced the best iron and iron products in the whole of what is now north-eastern Tanzania and south-eastern Kenya. The iron and its products were extensively imported by other societies like the Wataveta, Wachagga and Wakabe, which had their own iron works (Maghimbi, 1994). Ugweno society also had highly specialised wood workers, weavers and potters. Pottery especially was very developed, and the pots from this area are exported to towns even today, and used to be exported to Kenya, as recently as early the 1960s (Maghimbi, 1994).

In Mbozi, the insatiable demand for ivory created a demand for heavy spears to hunt elephants. The heavy iron spears used by elephant hunters were made by highly skilled craftsmen – the master iron-workers. Iron ore was collected from swamps and placed in a kiln eight to ten feet high, along with charcoal and a certain medicine regarded as highly potent. After the first smelting the iron was smelted again in a second smaller kiln to make it especially pure; then it was beaten into tools – hoes, axes, knives and spears, and also wire for ornaments. The Mbozi area was also famous for cotton weaving using wildly growing cotton. An early traveller through the area reported that wild cotton was growing plentifully and was woven into pretty patterns of cloth. Every village boasted two or three looms (Brock, 1968: p. 75). Iron implements of many kinds were also produced on the Fipa plateau and the surplus was traded for cotton cloth woven in the Rukwa valley (Willis, 1968, 91).

The largest centre of production of various goods was the Nyamwezi area. The Nyamwezi area was involved in trade of iron, for making hoes, axes and spears, for many years. There were few iron works in the area, perhaps only in Usangi and Mhunze, north-west of Tabora. Further away, iron was extracted in Rusuubi, eastern Uzinza, and Ukonongo. Iron smelting was practiced only by special families who transmitted both the technical and magical techniques that were necessary. There was an extensive trade in iron goods. Nearly all the hoes traded in the northern part of Tanganyika were from the Nyamwezi area. Salt was another commodity produced and extensively traded. Most of the high-quality salt came from Uvinza brine springs (Roberts, 1968, 123). Copper played an important part in Nyamwezi trade in the nineteenth century. Some came from the coast, with the development of the ivory trade, but much also came from Katanga. By the 1850s, copper bars from Katanga were being carried up Lake Tanganyika to Ujiji to the smiths of Ha and Sumbwa, who made copper ornaments and wire for bracelets, to be sold throughout the interior. By 1880, Nyamwezi controlled most of the copper trade between Katanga and Tabora (Roberts, 1968, 125).

Nascent industries were already developing in Tanganyika prior to colonisation. Unhindered, these industries would have developed into modern industries, with technologies borrowed from other African countries or externally. Colonialism led to death of these productive and marketing activities with importation of cheap goods from factories in Europe. Over time, technology that was developed locally in iron smelting, cloth weaving, weapon production and pottery came to an abrupt halt, and skills development that was taking place mostly through apprenticeship also disappeared.

During the colonial period very little industrial development took place as one of the aims of colonialism was to use colonies as markets for goods produced in the coloniser countries. At the time of independence Tanzania had few manufacturing establishments, employing not more than 20,000 people, and the sector contributed only 4.3% to the GDP (Mussa, 2014, 4). The period between 1961 and 1967 saw a surge in manufacturing activity, a period of import-substitution industrial development. Most of the industries established focused on consumer goods, food and textiles. By 1970 the country produced enough fabric, 58 million square meters, to meet the national demand. At that time, there were more than 2000 industrial establishments operating. Between 1961 and 1970, production increased at an annual rate of 10% and employment increased at an annual rate of 12%. Focus was on light industries producing goods such as food, clothing, tobacco products, beer, pharmaceuticals, glassware, household plastic, footwear and soap (Mussa, 2014: p. 5). The manufacturing growth rate increased from 10.2% in 1962 to 17.1% in 1966, and the contribution of manufacturing to GDP increased from 4.3% in 1961 to 12.8% in 1965. Industrial employment increased from 6.2% in 1964 to 24.1% in 1968 (Mussa, 2014, 6).

The growth was not sustained due to the shortage of foreign currency which began to emerge following insufficient foreign earnings from trade in goods and services, a salient feature of Tanzania's economic woes of the era. The global oil crisis of 1973 further exacerbated the shortage of foreign exchange necessary for the importation of capital and intermediate goods. Consequently, the country experienced deteriorating balance of payment which adversely affected industrial production in the 1970s and 1980s (Wangwe et al., 2014, 6). Between 1975 and 1981 the growth rate in manufacturing was 0.6% and was negative, -3.9%, between 1981 and 1985. Tanzania's acceptance of a Structural Adjustment Programme (SAP) in 1986 led to accepting conditionality in return for loans to sustain the economy. Conditionality imposed on the country was two-pronged. Domestically the country was required to increase available resources by reforming the tax system, reducing or eliminating fiscal deficit and creating new sources of revenue.

Structural conditionality required Tanzania to reduce the balance of payment deficit through currency devaluation, reform the tax system and create more sources of revenue. Within the financial sector the SAP required the government to improve the regulatory framework, restructure the institutions and relax interest rate ceilings. The government was advised to close the non-profit making entities. In the agricultural sector the SAP required the government to deregulate trade and liberalise agricultural prices. The government was to reduce protection for local industries and develop an export-oriented strategy. The SAP also required Tanzania to reduce tariffs on imported goods and remove restrictions on imports. Adapting SAP conditionality led to increased unemployment, lower wages, an increase in the cost of goods and services and flooding of the local market with imported goods. Many local industries closed as they were not able to compete with imported products.

Acceptance of these conditions led to an increase in imports of cheap goods with which local industries could not compete. Many industries collapsed. Yet the industrial sector started to recover in the late 1990s. Industrial production increased from 5.5% in 1998 to 9.9% in 2008 and fell to 7.7% in 2013. Similarly, industrial exports in total export earnings rose from 1.1% in 1998 to 8.29% in 2004, to 20.73% in 2008 and to 20.04% in 2013 (Mussa, 2014). Increased investment and better capacity utilisation accounted for the increased production.

Tanzania also does well on the Manufacturing Value Added (MVA) indicator. Between 2000 and 2010, Tanzanian MVA increased from US $894 million to US $1992 million in constant terms (URT, 2012, 24). The growth rate of MVA has been remarkable and was constantly above 8% during the decade. Despite the impressive MVA growth rate, the industrial base remains one of the lowest in the world (URT, 2012, 24). To put things in perspective, it would take Tanzania 45 years, at its current MVA levels, to reach the current level of South Africa, if South Africa remains at its current level (URT, 2012, 25). However, with an increased growth rate and learning from the experiences of other countries Tanzania can achieve rapid industrialisation.

One of the problems faced by Tanzania in attracting and retaining labour-intensive industries is higher labour costs and lower skill levels compared to those prevailing in competing Asian economies. Tanzania's labour force compared to middle income countries has low skills and is unmotivated. Approximately 85% of its workforce in the industrial sector has low skills compared to 55% in middle income countries. For example, a new garments factory in Tanzania is in need of 14,000 workers but managed to get only 2000 suitably qualified employees (Mussa, 2014). In 2014, Tanzania exported products valued at 4750.9 billion shillings and the leading exports were gold (57.0%), cashew nuts (13.6%); cotton (11.8%); tobacco (6.7%) and coffee (4.3%) (URT, 2015a, 42). Industrialisation in the country is still in the nascent stage. It has failed to take off given competition from cheap, mass-produced goods from countries such as China.

1.3 Availability of a Skilled Workforce

One of the key challenges facing industrialisation in Tanzania is obtaining labour with the required skills. Before we move further, we will define what skills are and how are they developed. At the simple level skill is defined as the ability to do something that comes from training, experience or practice (Merriam-Webster, n.d.). A more complex definition is provided by the Business Dictionary, which defines skill as an ability and capacity acquired through deliberate, systematic and sustained effort to smoothly and adaptively carry out complex activities or job functions involving ideas (cognitive skills), things (technical skills) and/or people (interpersonal skills) (WebFinance, n.d.). Collins English Dictionary (2014) defines skill as "special ability in a task, trade, sport, etc., especial ability acquired by training or manual proficiency".

Skills development means developing an individual's skill set to add value for one's career development, thereby improving one's chances for employment and adding value for the organisation. Fostering an attitude of appreciation for lifelong learning is the key to workplace success. Continual learning and skills development requires identifying the skills needed for mobility, and then successfully seeking out training or on-the-job opportunities for developing those skills.

Both initial schooling and training are important for skills training, but far more important is on-the-job learning. On-the-job skills development comes from on-the-job activities and action learning, including internships and apprenticeships. Skills development can take place through experiences like managing a project, serving on a cross-functional team, taking on a new task, job shadowing, job rotation, etc. Interaction with colleagues can also improve one's skills. This includes having a mentor, being a mentor, coaching, participating

in communities of practice, serving as a leader in a staff organisation, etc.

The private sector in Tanzania sees many opportunities yet faces many constraints. The shortage of skilled labour, at all levels, is one of the most serious of those constraints. When compared to neighbouring Kenya, or other developing economies, labour productivity in the Tanzanian manufacturing sector is significantly lower. Value added per employee is 43% lower than in Kenya, 54% lower than in China and 37% lower than in India. Tanzania also falls behind China, India and Kenya in agriculture value addition and agribusiness processing, which suggests that despite Tanzania's heavy reliance on the sector for GDP growth, its workforce lags behind in adopting technology and investing in innovations that improve productivity and competitiveness (ATE, 2007, 3).

As part of this study, a survey was conducted in Dar es Salaam to establish the skills gap but also to find out stakeholders' views regarding how such gaps can be bridged for the realisation of Vision 2025. The survey was conducted in selected institutions and included employers as well as employees. Participants included management of selected firms, two training institutions, one regulatory authority, and one association of employers, as well as graduates, students and members of teaching staff in training institutions. Documents such as tracer studies of graduates and commissioned/government reports provided by the participating respondents were reviewed.

Most of the firms were of the view that the majority of employees lacked basic attitudinal skills such as communication skills, commitment to work, pro-activeness, time management, personal initiative taking, coordination, team spirit and honesty on entry to the job market. These attitudinal problems were mentioned by all the employers interviewed. It was however noted that whereas many of these skills could be developed through experience on the job, most graduates were taking longer to achieve that goal. Employers also revealed that some graduates could not easily adapt to the required work discipline because of a fixed mind-set. The issue of time management and commitment to work (for extra time/longer hours) was also found to be a problem.

The revelations from VETA showed that while their graduates were able to secure jobs in the formal sectors, a good percentage were self-employed but faced financial problems in sustaining their businesses. Ineffective staffing was mainly responsible for graduates being unable to secure jobs and opting for self-employment. Most of the self-employed were unsuccessful in expanding their activities, as they lacked capital to purchase the require tools for their trade. The findings from the training institutions were twofold. First, it was revealed that inadequacy of teaching materials and practical work had far-reaching implications for achieving the intended learning outcomes. It was pointed out that inadequate funding for practical work in the workshop and limited space due to increased intake of students posed serious problems for the mastery of skills that intended to translate cognitive to psychomotor skills. The second problem was related to poor background in mathematics among students joining VETA programmes. It was pointed out that some students had difficulties in understanding areas that required mathematics, partly due to poor background in the subject. VETA graduates also lacked measurement and estimation skills. One skill that was not developed was ensuring customer satisfaction and care; this skill was particularly needed for those VETA graduates who were self-employed.

The participants from training institutions were of the opinion that failure to develop required skills was due to the increased number of students without corresponding increases in the teaching and learning resources available for the programmes. The respondents also pointed out the absence of or limited time allocated for practical/field work. At the university level, for example, all field or practical work has been abolished except in engineering, business schools, the sciences and teacher training. Graduate student interviewees stated that there was a big mismatch between what was learnt at universities and what employers expected upon joining the world of work, pointing out the difficulty of relating what was taught at the university to what the employer expected. Reference was also made to the lack of writing skills required to produce reports on the job.

The United Nations Industrial Development Organisation (UNIDO) in collaboration with the government of Tanzania carried out a study (URT, 2012a) which assessed employer perceptions of skills among their employees by examining the presence of specific foundation skills such as 'literacy' and 'numeracy' or more advanced ones such as 'information technology' (IT) skills. Worrying signs emerged from the analysis of the current skills content of the workforce in Tanzanian businesses:

- Almost two-thirds of respondents claimed that none or few of their workers were literate,

- 80% claimed that none or few of their workers were numerate, and

- Nine out of ten respondents stated that none or few of their workers had IT skills (URT, 2012a, 68).

The inadequacy of literacy and numeracy skills is surprising as Tanzania has invested heavily in basic education since independence. Illiteracy implies the inability to follow written instructions or to understand blueprints, while the lack of numeracy skills at the shop floor level makes the introduction and effective use of modern machines and equipment extremely difficult (URT, 2012, 68). The lack of IT skills is understandable as only a few schools in the country develop IT skills among their students. The lack of foundation skills, that is, literacy and numeracy, reduces the effectiveness of in-house training, especially when a company seeks to move from simple to more complex technology in its production processes. As many companies are using low-tech production, only one-third of the firms stated that the share of literate workers in the company is insufficient; nearly half of the companies stated that numeracy skills were insufficient. The most critical skill need was in IT, as 60% of the firms stated that their workers' IT skills were insufficient (URT, 2012a). As production shifts to more complex processes, to benefit from emerging national and international opportunities, the need for more skilled workers will arise. This calls for various forms of collaboration with the education system and the government to define skill needs and quality standards.

The UNIDO study (URT, 2012a) asked firms to identify specific weaknesses among those employees who had university education. The study found that:

- On average, managers were more satisfied with their workers' academic, learning, communication and teamwork skills, and less satisfied with their workers' presentation, problem solving, initiative and analytical skills.

- Large businesses were less satisfied with the level of skills of their university-educated workers in almost all dimensions. These companies run higher-scale production processes which require organisational capabilities. They also tend to use bigger and sometimes more complex machines and equipment (URT, 2012, 69).

- The least satisfaction with the workers with a university education, in terms of problem solving, initiative and analytical skills, is found in medium- and high-tech manufacturing companies and in companies and businesses of the tertiary group, utility and construction.

- A majority of the firms rated STEM graduates as having modest (41%) or fair skills (33%), while the skills level of only one-tenth were considered good (almost none of the workers with a tertiary education were rated as having very good skills). Moreover, one out of three managers claimed that the company's STEM workers have no understanding of innovation, while nearly three-quarters reported that they have a 'fair understanding' of innovation. Hardly any respondent attributed a 'full understanding of innovation' to his/her STEM workers. Companies were particularly concerned about a set of issues that made STEM graduates particularly costly because they lacked experience and technical knowledge, needed retraining and long period of practical on-the-job training, had low levels of work commitment and demanded relatively high wages.

Another study (URT, 2014a, 25) found that 70% of employers were of the view that soft skills are very important in doing business successfully. Although employees generally have appropriate educational qualifications, they lack soft skills, those in the areas of communication, self-confidence, problem solving, team work, self-drive, capacity to adapt to new situations, leadership, setting goals, capacity to apply knowledge in practice and time management. This lack of soft skills is of serious concern, as it impacts negatively on job performance.

The UNIDO study (URT, 2012a) found that there was unmet demand for employees. Firms' need for university-educated workers was on average 15.5% higher than the currently employed and the higher-skill gap amounted to 17% for STEM graduates. These skills were needed to overcome current production constraints. The skills gap between the actual and required share of tertiary-educated workers varies considerably across business groups and types. First, the larger the company, the larger the gap: demand for university-educated workers was small in small companies. These companies wanted to increase their share of university-educated workers by only 5%, while large companies wanted this share to increase by more than 20%. This 'size effect' is higher for STEM graduates. The skills gap is largest in medium- and high-tech sectors, confirming the 'technological effect' the skills-intensity analysis uncovered. Not surprisingly, companies that are extensively involved in innovation also reported the largest gap, which implies that their innovative activities cannot unfold properly as a result of the lack of relevant (higher) skills (URT, 2012a, 70).

Most of the firms in the UNIDO study, about 84%, stated that they were seeking graduates from STEM fields, followed closely by graduates from business schools. Over three-quarters of companies were seeking graduates with an engineering degree, closely followed by those with a degree in computer science. Meeting the demand for STEM graduates is

problematic, because it is the science and math fields where most students fail in national Form 4 examinations. Table 1 shows performance in math and science subjects in Form 4:

TABLE 1: SECONDARY FORM 4 EXAMINATIONS (CSEE) PASS RATES IN SELECTED SUBJECTS 2009–2014

Subject	2009	2010	2011	2012	2013	2014
English	57.9	30.1	30.1	26.1	45.7	55.1
Biology	43.2	30.5	43.4	30.5	37.1	48.3
Basic Mathematics	17.8	16.1	14.6	11.3	17.8	19.6
Physics	55.5	44.6	43.2	42.5	44.1	46.7
Chemistry	57.1	43.9	43.3	46.0	50.2	56.7

Source: URT (2015) Pre-Primary, Primary and Secondary Education Statistics 2014: National Data Dodoma: Prime Minister's Office: Regional Administration and Local Government.

Tanzanian people and the government recognise the importance of science in today's world, and the government has made several efforts to popularise science and improve its teaching in schools. Various efforts have been geared towards improving the pedagogical approach and shaping the curriculum of science courses. Several books have been published to popularise science among students. *Lighting Fire,* which was launched in 2012, is an effort towards popularising science in schools and colleges. Another book, *Enjoy Chemistry,* was translated into Kiswahili with the title *Furahia Kemia* to make it accessible those students who are not fluent in English (Seka, 2015).

In 2014, President Kikwete ordered all regional and district commissioners in the country to ensure that by November of that year all ward secondary schools in their respective areas would have laboratories for science subjects. Prime Minister Mizengo Pinda ordered all district commissioners and council executive directors and education officers to ensure that by May 2015 all ward secondary schools would have constructed science laboratories (Siyame, 2015). The next action is to equip the laboratories with the necessary laboratory kits, including chemicals and apparatus. This should go hand in hand with training laboratory assistants and ensuring teachers' ability to guide pupils to conduct scientific experiments.

The Ministry of Education and Culture (MOEC) has in the past initiated several projects to improve science education in secondary schools. Such efforts include the Science Education in Secondary Schools (SESS) project that operated between 1997 and 2001 and the Education II project supported by the African Development Bank (ADB). The aim of the ADB Education II project (ADF, 2007) was to strengthen the teaching of science in 306 government and community-built public schools in the mainland. This component concerned (a) the construction, equipping and furnishing of three laboratories, one special practical room and four ancillary rooms at each of the 36 community-built public secondary schools; (b) the provision of 400,000 textbooks and teaching materials in four subjects (biology, chemistry, physics and mathematics) for 100,000 students in the 306 government and community-built public secondary schools in 110 districts; and (c) the provision of professional in-service training for 900 science teachers in 306 government and community-

built public secondary schools in the 110 districts, and maintenance training as well as training in book management for 72 teachers from the schools, of which three were to be provided with laboratories (ADF, 2007, 2, 3). Other projects included a teacher-education programme in mathematics and science run by the University of Dar es Salaam, and the Science Teacher Improvement Project (STIP), which was mainly run by Christian schools. These projects and several curriculum reviews cutting across many subjects offered at the secondary-school level have not been able to bring about a remarkable change in student achievement in science subjects. CSEE results in science subjects have shown extremely poor performance for many years.

Despite these efforts by the government in recent years, data in Table 1 show that Tanzanian education is unlikely to meet demand for STEM graduates in the near future, unless specific actions are taken to increase the number of students opting for science subjects and to create conditions to improve pass rates. Obviously, the teaching of math and sciences will have to improve at all levels to ensure the skilled manpower that industries need. Demand for graduates from other, non-STEM academic fields such as the arts, languages, social sciences and in particular the humanities is relatively lower. Nevertheless, about half the companies were seeking to recruit graduates from these fields. The skills gap analysis enables identification not only of the quantitative gaps, but also of the qualitative one, that is, those specific graduate types that are particularly relevant for the structural transformation of a catching-up economy. In this respect, the demand for higher skills by Tanzanian companies reflects their goal to upgrade production processes and to climb the technological ladder towards middle income country status.

A study commissioned by the Planning Commission (URT, 2014b) assessed the amount of skilled labour needed for Tanzania to achieve middle income status. Table 2 shows the manpower needed for various occupations.

TABLE 2: PROJECTED TARGETS OF SKILLED LABOUR FORCE (PROFESSIONAL LEVEL) IN SELECTED OCCUPATIONS NEEDED TO ACHIEVE MIDDLE INCOME COUNTRY STATUS BY 2025

Occupation	As of June 2012	2015/16 (Projected)	2024/25 (Need)
Engineering, manufacturing, construction	14,196	17,600	148,800
Agriculture	3,717	4,175	15,130
Science	16,049	20,920	87,100
Health and welfare	48,215	64,000	212,200
Services	105,433	119,200	400,600
Social Services/business/law	291	329	1,089
Humanities/arts	8,738	9,870	32,680

Source: URT (2014b, 3).

The study done by UNIDO in collaboration with the Tanzanian government estimates the high-level manpower required for the country to achieve middle income status by 2025. These numbers are staggering. Another study done by UNIDO, the Industrial Skills Survey (URT, 2012a), projects much higher needs for the country to achieve middle income status. The study concludes:

- The occupational categories in need of a higher proportional share of workers are those for which higher skills are required and, in particular, those categories linked to STEM degrees.

- Taking MMIC as a benchmark, Tanzania needs to almost triple the number of technicians and increase the number of professionals six fold (as a percentage of the working population).

- If Tanzania is to reach middle income status by 2025, nearly 300,000 engineers, architects and related technicians will be required, along with up to 90,000 physical scientists and related technicians and 70,000 life scientists and related technicians (URT, 2012a, 72).

- Supporting an industrial, middle income country structure will also require a massive increase in administrative and managerial positions of nearly 430,000 (URT, 2012a, 73).

In order to achieve the targets of the NFYDP II (2016/17–2020/21), a five-year skills development plan has been established to address the critical- and scarce-skill gap in areas such as technology, health, construction, ICT, mining and agro-business. Table 3 shows the number of people to be trained for each sector.

TABLE 3: NATIONAL SKILLS DEVELOPMENT TARGETS FOR SELECTED SECTORS 2016/17 TO 2020/21

INDUSTRY	2016/17	2017/18	2018/19	2019/20	2020/21	TOTAL
ICT	1,584	1,584	1,584	1,584	1,584	7,920
HEALTH	1,056	1,056	1,056	1,056	1,056	5,280
CONSTRUCTION	2,112	2,112	2,112	2,112	2,112	10,560
MINING	1,056	1,056	1,056	1,056	1,056	5,280
TOURISM	2,112	2,112	2,112	2,112	2,112	10,560
AGRIBUSINESS	2,640	2,640	2,640	2,640	2,640	13,200
TOTAL	**10,557**	**10,557**	**10,557**	**10,557**	**10,557**	**52,800**

Source: (URT, 2015a, 7).

The implementation of the proposed skills development initiatives will require a total of Tsh. 15 billion from the employer's SDL collection, distributed as shown in Table 4 below.

TABLE 4: RESOURCE REQUIREMENTS AND BUDGET DISTRIBUTION (Tsh)

No	Item	2016/17	2017/18	2018/19	2019/20	2020/21
	Undertaking apprenticeship and internship	4,068,200,000	4,068,200,000	4,068,200,000	4,068,200,000	4,068,200,000
	Undertaking workplace trainings	4,036,000,000	4,036,000,000	4,036,000,000	4,036,000,000	4,036,000,000
	Strengthening labour-market information system	800,000,000	800,000,000	800,000,000	800,000,000	800,000,000
	Undertaking of skills analysis (manpower survey)	2,363,800,000	2,363,800,000	2,363,800,000	2,363,800,000	2,363,800,000
	Undertaking demand-driven skills trainings for youth in the informal sector and recognition of prior-learned skills	1,536,000,000	1,536,000,000	1,536,000,000	1,536,000,000	1,536,000,000
	Coordination, monitoring and evaluation	2,196,200,000	2,196,200,000	2,196,200,000	2,196,200,000	2,196,200,000
	Total	**15,000,000,000**	**15,000,000,000**	**15,000,000,000**	**15,000,000,000**	**15,000,000,000**

Source: URT (2015a, 9).

A large part of the funding for the skills development programmes will come from the Skills Development Levy (SDL) collections. This mechanism was agreed to by the government and representatives from the Tanzania National Business Council (TNBC), Tanzania Private Sector Foundation (TPSF), workers' and employers' organisations in March, 2015 (URT, 2015a, 9). Skills development will ensure that the programme is responsive to the requirements of the labour market and industrial economy.

2. EDUCATION AND TRAINIING FOR SKILLED LABOUR FORCE

This chapter examines the role education plays in developing skills and productive capabilities among the youth of Tanzania. This role of education is beneficial at two levels. At the individual level, the person who benefits from education can increase his or her personal income through employment and self-employment. This link has a transformative power; it can lead to reduction of poverty. This link will be operational if children of the poor are able to access quality education and make full use of their talents. Access to education at various levels is equitable or discriminatory depending on the social policies followed. To start our discussion on education we will examine the social policies in education as these determine how educational opportunities, and corresponding opportunities in employment, are distributed among the population.

2.1 Social Policy in Education

On achieving independence in 1961, the government of what was then Tanganyika inherited a fragmented country – divided along racial, religious and ethnic lines. Nation building required the country to do away with these cleavages and build a united country. The newly established government saw education as a vehicle for nation building. The goal of the post-colonial government centred on unity, equality and participation by the majority of the population in local and national development efforts. As education was considered to be crucial to achieving these ends, the system was restructured and reoriented to meet the new goals. This aim of the new government was clearly reflected by Julius Nyerere, the nation's first Prime Minister, in his independence message of 1961, which declared, *"we have agreed that our nation shall be a nation of free and equal citizens, each person having an equal right and opportunity to develop himself, and to contribute to the maximum of his capabilities to the development of our society".*

The first ten years after independence were crucial. One reform after another impacted on the education sector, all aimed at achieving the goal of ensuring equal opportunity for all to develop through education. In order to achieve these aims the government needed to be in total control of the education system. Prior to independence, various bodies were responsible for provision of education, along racial and religious lines. Each body was concerned about the education of their children. Under the Education Ordinance of 1961, segregated education committees were abolished, and in their place a single committee on education was established (Cameron and Dodd, 1970, 174). As a result of this ordinance, education came under the formal control of the Ministry of Education.

In 1962, the Education Act was passed, which repealed the 1927 Education Ordinance. The Education Act of 1962 among other things abolished racial discrimination in the provision of education. It also designated Kiswahili as a language of instruction in primary schools. The Education Act also made admission to school on a non-religious and non-racial basis obligatory. The integration of a racially organised school system was accomplished from the top down. Higher education in East Africa was already organised along non-racial

lines; secondary schools and primary schools now followed suit. The result was that by 1966, African pupils formed the majority students in schools previously built for Asian and European children only (Morrison, 1976, 97).

During the colonial period, religion was an important consideration when admitting a pupil to schools run by faith-based organisations. To overcome continuing religious discrimination, the government established regional selection boards to introduce effective government control over admissions. To reduce disparity in enrolment based on income, fees were abolished in 1963 in all aided secondary schools because they discriminated against children of the poor and therefore mostly against African children (Cameron and Dodd, 1970, 176).

The Education Act 1962 also established a Unified Teaching Service (UTS), bringing all teachers under the same umbrella (URT, 1995, ii). Under the legislation, the UTS became the legal employer of teachers at all levels. Although voluntary agencies continued to pay the salaries of teachers from grants-in-aid, they lost their independent control over salaries and working conditions and the recruitment and posting of teachers (Morrison, 1976, 96). Despite the control established over voluntary agencies, the continued existence of these agencies had several drawbacks. Most serious of these was that the older, Christian agencies retained considerable influence on the development of education at the local level (Morrison, 1976, 97). These problems eventually contributed considerably to the decision to nationalise the schools during the post-Arusha Declaration period and the state became practically the only provider of formal education, although Christian seminaries continued to operate as they were seen as institutions preparing religious leaders.

By the mid- 1960s the basic structures of education in the post-colonial period were established and the major problems inherited from colonial education were addressed. Discrimination in access based on religion and race had been eliminated. Abolition of fees ensured that no child was barred from accessing education. Kiswahili as a medium of instruction in primary schools, and a common curriculum, were part of nation building. This effort was further strengthened by not limiting teachers and students to schools in areas from where they originated.

After more than five decades since independence, Tanzania is back to where it started, and again education is being used to build walls between different groups of people. This has arisen mainly because of the government's *laisse faire* attitude towards establishing private schools. Now, there are primary and secondary schools whose clientele belong to one race or religion. There are schools, such as Hindu Mandal or Shabaan Roberts, where most of the students are Asian. Seminaries, both Christian and Muslim, have mushroomed in the last couple of decades, which cater to the children of a particular faith. We would not be wrong to say that a Muslim child or a Christian child can go through the whole education system – from nursery to the university – attending schools meant for their own faith.

The government has taken several steps to ensure that all children have access to primary and secondary schools. The abolition of school fees in primary schools as a result of the implementation of the Primary Education Development Plan (PEDP) has resulted in a significant increase in primary school enrolment. In one year, enrolment in Standard 1 increased from 1,139,334 in 2001 to 1,632,141 in 2002, a whopping 43.3% increase

(URT, 2005a, 13). In line with the Education and Training Policy of 2014, on November 27 the government issued Circular 5, which directed authorities to ensure that secondary education was free for all children. The circular stated that:

Provision of free education means pupils or students will not pay any fee or other contributions that were being provided by parents or guardians before the release of the new circular.

The directive now means that children in Tanzania will enjoy 11 years of free schooling. The abolition of school fees at the secondary level is expected to increase enrolment and attendance, as occurred in 2002 when primary education was made free and the primary net enrolment rate jumped from 59% in 2000 to 94% in 2011 (GEMR, 2015).

Perhaps of more concern are private schools to which children of the poor, who comprise the majority in the country, are barred access because they cannot pay the fees charged. The problem of private schooling is found at both the primary and secondary levels. The number of private primary schools in the country has grown from 204 in 2005 to 767 in 2013 and that of secondary schools from 543 in 2005 to 1062 in 2014 (URT, 2015, 41). The number of private primary schools is tiny, less than half of all primary schools in the country. Yet, the proportion of private primary schools among the top-performing schools is much higher than their number justifies. In the 2014 PSLE rankings, the top 15 schools were all private schools. The top school, Twibhoki in the Serengeti district, had an amazing average score of 93.88%. Out of 33 pupils at Twibhoki, 30 received an A in all five subjects, and only three pupils received a B average, two in social skills and one in mathematics. These top 15 schools were not from the normally well-performing districts, but were from across the country. Moshi Rural, Ilala Urban and Kinondoni Urban had one school each in the top 15 schools. Kahama Urban had three schools in the top 15 schools. Of the top 50 primary schools in the PSLE ranking, only five were public schools (NECTA website).

Recent research by HakiElimu shows that primary and secondary schools that perform well have several common characteristics. These include a small student–teacher ratio; high class attendance by teachers; and highly qualified and experienced teachers. In well-performing schools there was a high degree of interaction between teachers and parents compared to poor-performing schools. Good schools also organised regular professional development courses for their teachers. Well-performing schools enforced a strict code of conduct, which was known both to students and parents. Well-performing schools provided teachers with good working conditions; teachers were given free lunches from the school cafeteria and were provided with good and well-equipped offices (HakiElimu, 2014, iv).

Teacher accountability was strictly enforced. Teachers were required to ensure that their students did well on the national examinations. Any teacher failing to do that soon lost his/her employment. Well-performing schools went to great lengths to ensure that only top students were admitted to their schools and these students had to maintain a high performance throughout their stay in the school. The well-performing schools were geared to ensure that their schools ranked high in the PSLE, CSEE and ACSEE. The performance of good schools depended more on the management of the schools and the type of students enrolled than on the teachers employed by schools (HakiElimu, 2014, v).

Why is this a matter of concern? First, it shows how poorly children are taught in public schools. The majority of teachers in private schools have received the same training as their colleagues teaching in public schools, yet the performance of students in public schools remains poor. Second, private schools are dividing Tanzanians along income lines, negating gains made as a result of policies followed immediately after independence. Private schools are accessed by children of the elite, whose parents who can afford to pay high fees; these are mostly members of the salaried class and those engaged in business. Children of the poor, however talented they may be, are excluded from these schools because of their poverty. Children of the elite who attend these English-medium primary schools and perform well will move on to the top secondary schools. Given their English proficiency gained in private schools, they will also enter secondary schools with the added advantage of having better English literacy than those children joining from public primary schools. We have created a dual education system which is creating two kinds of citizens: those who are well-educated, fluent in English and find good jobs, and the majority, who lack English fluency and struggle to find any job. Certainly this situation cannot be accepted in Tanzania which has prided itself on providing equal opportunities to all its children.

The situation is same in secondary schools. There were 1061 private secondary schools in 2014 out of 4753 secondary schools, representing 22.32% of the total. In the 2014 CSEE, 21 schools had an average Grade Point Average (GPA) of above 4.000; all were private secondary schools. Of the top 50 secondary schools, only Ilboru, ranked at 35, was a public school. The top secondary school in the country was Kaizirege in Kagera, where all the 83 students passed with distinction. The school had an average GPA of 4.5374. Of all the secondary schools, Kaizirige ranked first in history, geography and basic math; second in English; and third in chemistry and biology (NECTA website). It is almost a given that most students graduating from these well-performing private schools will go on to Form 5 and then to university. The majority of students from poorly performing public schools, especially those studying in community schools, will not reach university. This situation has serious implications for using education to break the cycle of poverty.

Education for Girls

Education for girls is important from both the equality and rights perspective as well as the developmental perspective. Education for girls is essential for the ability to exercise rights and consequently for women's empowerment. Education enables girls and boys, women and men to participate in social, economic and political life and is a base for the development of a democratic society. The social and economic benefits of education are well known, and offer important advantages that girls and women can draw upon. Increasingly, interventions in education focus on the coupled approach of access to and quality of education, both related to gender equality. There are several issues related to girls' education and all need to be addressed systematically. These are: low enrolment; low retention; low achievement; and the widening gender gap in higher education.

The government has taken various steps to ensure equality of all its citizens and, in particular, gender equality and gender equity. The Ministry of Community Development, Gender and Children was established in 1990 as the national machinery for spearheading gender development in the country. The Ministry, among other things, has facilitated the formulation of the Women and Gender Development Policy (URT, 2004). The aim of this policy is to ensure

that the gender perspective is mainstreamed into all policies, programmes and strategies. In order to meet this objective, the national machinery initiated the establishment of gender focal points in ministries, independent government departments, and regional and local authorities. These focal points in turn will be responsible for gender mainstreaming in their respective plans and programmes, while working with the national machinery, which has a coordinating role in gender development. This, together with other legislative, administrative and affirmative actions, has enabled Tanzania to record remarkable achievements in gender development. The Ministry also formulated the National Strategy for Gender Development (NSGD) (URT, 2004), which provides guidance on interventions to be made and identifies roles of various actors and stakeholders. The NSGD also suggests coordination mechanisms that will facilitate the participation of the various actors, and how they might create the requisite linkages. It is hoped that the NSGD will not only make implementation of the Women and Gender Development more focused, but also more results-oriented.

In education, the issue of gender received specific attention in 1974 when the Policy on Universal Primary Education (UPE) and the Musoma Resolutions were promulgated. The two addressed the issue of gender equality across the various social sectors, including education. One of the features of the policy and the resolutions was free and compulsory enrolment for both boys and girls of primary school-going age. Gender equality was later renewed in the Education and Training Policy of 1995. In order to raise the participation rate of girls in education the policy recommended several interventions. These included the establishment of co-educational and girls' secondary schools and the establishment of girls' day streams in existing government secondary schools in communities where girls' secondary education was severely affected (URT,1995, p. 19), both focusing on increasing girls' access to secondary education.

Since then, the gender equality issue in education has been among the top priorities of the Ministry of Education and Vocational Training. As a result, a 'gender desk' was established in the Ministry's head office. It looks after gender issues including access and parity in education, girls' retention in school, gender-sensitive curricula, and the protection of girls against violence.

Though commendable, government efforts have focused narrowly on girls' access without addressing other important issues like performance. Boys outperform girls in all national examinations, be it the PSLE or CSEE (URT, 2015, 66–67, 69). As admission to the next level depends on their performance, girls are thus at a disadvantage when it comes to selection for secondary or higher education. Retention is another issue that has not received adequate attention.

Persisting Inequalities

After more than half a century of independence glaring inequalities remain, especially in terms of gender and location; these have been notoriously difficult to address. Education has not become inclusive; there are still people who fall through the net. National Bureau of Statistics (NBS) data show that in 2011/12 nearly a quarter of the population in rural areas had no education compared to only 4.4% in Dar es Salaam. The low levels of education in rural areas is also reflected in illiteracy rates. Compared to 4.8% in Dar es Salaam, nearly one-third of the population in rural areas was illiterate. The situation for women is even

worse. Overall, women have lower levels of education than men, wherever they reside. In Dar es Salaam 6.3% of women had no education compared to 2.4% of men. In rural areas the situation is even starker. Compared 17.1% of men without education in 2011/12, 30.9% of women had no education (URT, 2014, 46, 47, 49).

Similarly, on the PSLE children in urban areas outperform children in rural areas and everywhere boys outperform girls. In every region children in urban districts outperform children from rural districts. For example, in the Arusha region the PSLE pass rate in 2014 for urban Arusha was 87.1% compared to 74.0% for Arusha rural; Karatu (52.7%); Longido (55.8%); Meru (62.2%); Monduli (50.3%) and Ngorongoro (49.6%) (URT, 2015, 136–146). Generally the performance is better in urban districts and gets poorer as the distance from the urban district increases. This trend has been consistent for the last 50 years.

There is a dearth of data on inequalities in education based on income. We do not know what proportion of children who attend private secondary schools go on to university compared to the children who attend public schools. There is no data showing whether the children of the rich, who attend private schools, gain disproportionate advantage in terms of employment.

2.2 Skill Development through Education

In this section we will examine how skills are developed at different levels of education. There are two fundamental problems that the education sector is facing that negatively impact the economic transformation of the country. These are the low quality of education and the relevance of education for Tanzania in the twenty-first century.

2.3 Basic Education: Poor Quality Leads to Unskilled Graduates

Quality basic education is important as it is during these initial years that foundational skills such as literacy and numeracy are developed. It is difficult for children to acquire these skills if they do not do so during their first years in school.

Two issues stand out. First, the country has made great progress in increasing access to both primary and secondary education. Nearly all children of school-going age enrol in primary school. Currently there are more than 8 million children enrolled in primary schools. Every year more than 800,000 children graduate from primary school, of whom half go on to secondary school, leaving a large number of primary-school graduates entering the labour market. Secondly, large numbers of students come to the labour market after completion of secondary education, many unable to find employment in the formal sector.

There are two major concerns about primary education. The first has to do with the quality of education and second has to do with the equity issue. Both these issues will be discussed briefly.

Quality is a Primary Concern

Below is an extract recently seen in a daily newspaper This, unfortunately is not a unique case as similar situations are found in many schools and often get reported in newspapers.

Our Form One students read and write at nursery level: teacher

Public secondary schools in Butiama not only struggle to cope with crowded classrooms forcing them to turn libraries and laboratories into classrooms; they are also battling with huge numbers of Form One students who cannot read and write.

At Kemoramba Secondary School in Butiama District teachers say that some of the students who joined the school early this year were typical candidates for nursery school. Mr. Mayala Joseph, the school's deputy headmaster said it was now an extra burden on the teachers: "We have been forced to teach them what they were supposed to learn at nursery school."

The teachers are caught between rock and hard place. "We don't have mandate to send the students back home because they have been selected to join our school despite the fact that they can't write and read," the frustrated deputy headmaster explained.

The Citizen, April 22, 2016.

A good-quality primary education that leads to graduates acquiring basic literacy and numeracy levels – foundation skills – should be adequate to prepare them for the world of work. This is not happening. It would not be unrealistic to say that Tanzanian education is in deep crisis, and unless the government takes urgent steps to rectify the situation, the problem will get worse. Schools, especially at the primary and secondary levels, will keep on producing graduates who are unemployable. First, the good news. The government can be commended for ensuring almost universal access to primary education. Another positive aspect of primary education is that there are as many girls attending primary schools as boys; gender equity has been ensured. However, quality remains a big concern. Most children aged 7 to 13 are going to school but little learning is taking place.

The Uwezo Findings

Recently several studies have shown how little learning is taking place in primary schools. The recent Uwezo Assessment of Learning Outcomes 2014 shows that in Standard 3 fewer than half can read a Standard 2 Kiswahili story. In Standard 7, 80% of children were able to read a Standard 2 Kiswahili story. This is worrying, as after seven years of education 20% of the children are coming out illiterate. The situation for English was even worse. In Standard 3 only two students in ten, 20%, were able to read a Standard 2 English story, and in Standard 7, fewer than six in ten pupils (56%) were able to read a Standard 2 English story. Almost half of Standard 7 pupils are not literate in English, which is the language of instruction in secondary school. Numeracy ability was no better; only three in ten pupils in Standard 3 (31%) were able to solve a Standard 2 multiplication problem. By the time they reach Standard 7, about three in ten (71%) were not able to solve Standard 2 multiplication problems (Uwezo, 2015).

EQUIP (T) Findings

Equip (T) carried out assessment of children in Standard 3 in two areas, Kiswahili literacy and

math. In Kiswahili 1496 children were assessed. The study found that achievement of 38.3% of the children was below the Standard 1 level; 8.7% were at the emerging Standard I level; achievement of 16.8% of the children was at the Standard 1 level; 24.0% of the children were at the emerging Standard 2 level and only 12.0% achieved Kiswahili literacy at the Standard 2 level (EQUIP T, 2015; p. 3). In math 1487 were assessed. Performance in math was slightly better than in Kiswahili. The performance of 7.4% of the pupils tested was below the Standard 1 level; 26.7% of the pupils were at the emerging Standard 1 level; and 30.7% had achieved the Standard 1 level. Slightly more than a quarter of the tested pupils were (29.7%) at the emerging Standard 2 level and only 6.1% had achieved the Standard 2 level of numeracy. The study concluded that *the vast majority of the Standard 3 pupils are not achieving at the expected curriculum level in Kiswahili and mathematics* (EQUIP T, 2015, 3).

Findings from the SACMEQ

The Southern and Eastern African Consortium for Monitoring Education Quality (SACMEQ) paints a much better picture of the quality of education in the country. Tanzania became a member of the consortium in 2000 and so far two assessments have been carried out in the country, SACMEQ II in 2000 and SACMEQ III in 2007. SACMEQ IV was planned to be carried out in 2014. The ministries of education in relevant countries (14 at the last count) are responsible for carrying out the assessment. SACMEQ assesses pupils in Standard 6 in two areas, reading and numeracy. In 2000, 2854 pupils from 181 schools were assessed. In 2007, the number of children assessed was 4194, from 196 schools (IIEP, 2010).

SACMEQ data from the 2007 assessment show that pupils in Tanzania outperformed pupils in all the other countries in reading competency. For Tanzania, the mean reading score increased from 545.9 in 2000 to 577.8 in 2007, an increase of 31 points. Similarly the mean score for numeracy increased from 522.4 to 552.7, an increase of 31 points. For Tanzania, the mean scores of Standard 6 pupils showed a high level of achievement both in 2000 and 2007 as the scores were significantly higher than the SACMEQ means (IIEP, 2010).

Findings from the EGRA, EGMA and SSME National Baseline Assessment

The national assessment of learning outcomes among Tanzanian children was conducted between October 21 and November 1 in 2013 using the Early Grade Reading Assessment (EGRA) and Early Grade Mathematics Assessment (EGMA) tools to assess children's reading ability in Kiswahili and English and in mathematics. Data were collected from 200 primary schools in 20 districts. In all, 2226 Standard 2 pupils were assessed (USAID, 2014). Preliminary findings of the EGRA showed:

1. Pupils perform much better on the Kiswahili assessment than they do on the English assessment.

2. In general pupils perform reasonably well on Kiswahili pre-reading skills (syllable, sounds, familiar words, and invented words) although there are too many pupils unable to respond correctly to a single item.

3. Reading comprehension was significantly better for Kiswahili than English. Although 40% of the pupils were reading with some comprehension, very few were reading with

full comprehension. 40% of the pupils scored zero on a comprehension sub-task.

4. Hardly any pupils were able to read English with any level of confidence and none were able to read fluently.

The EGMA findings showed:

1. Pupils in Standard 2 did reasonably well on more procedural tasks. On Level 1 addition and subtraction pupils scored on average of 60% or better on these sub-tasks.

2. Pupils did better on addition than on subtraction. 22% of the pupils were unable to answer even a single Level 1 subtraction question.

3. 58% of the pupils were unable to answer a Level 2 subtraction item correctly, such as 18- 4 = ☐

4. Assessed pupils did better on addition than on subtraction. Twenty-two per cent of the pupils were unable to answer a single Level 1 subtraction item, the easiest being 4-1= ☐

Like the Uwezo findings the EGRA and EGMA assessments found that the differences in performance by gender were not statistically significant. Pupils in urban areas tended to perform better than pupils in rural areas.

The above findings shed doubt on the expectation that education will lead to poverty reduction. There are significant geographical and socioeconomic disparities. In all three assessment areas, children in urban areas outperform children in rural areas. The Uwezo findings show that the gap in performance between urban and rural children is almost 20% in all three subject areas. Forty-six per cent in rural areas and 67% in urban areas can read a Standard 2 Kiswahili story; 26% in rural areas and 44% in urban areas can read a Standard 2 English story; and 36% in rural areas and 54% in urban areas can do Standard 2 multiplication. Poor performance of children in rural areas limits their opportunity for accessing good, well-paying jobs. The ten districts with the highest pass rates are all in urban areas and the ten districts with the lowest pass rates are all rural.

Similar differences were evident between the children of the rich and those of the poor. The Uwezo findings show that 40% of children in ultra-poor households were able to read a Standard 2 Kiswahili story compared to 57% of children in non-poor households. Twenty per cent of the children from ultra-poor households were able to read a Standard 2 English story compared to 35% of the children in non-poor households, and 31% of the children from ultra-poor households were able to do multiplication compared to 46% of the non-poor households. There were no marked differences in performance between boys and girls of all ages in Kiswahili, English or numeracy. Similarly there were no gender differences in terms of attendance. Although learning outcomes are low, they are equally low for boys and girls (Uwezo, 2015). Uwezo has been doing learning assessment for the last five years, and the results have been consistent across all three subjects, showing that we have not achieved any improvement in literacy and numeracy levels.

The performance of pupils in Standard 7 examinations, the Primary-School Leaving Examinations (PSLE), are no better. Every year, nearly half the pupils sitting for the exam fail (URT, 2015, 56). In 2014, more than 300,000 pupils failed the exam. Even among those who pass, most do with C and D grades. In 2014, only 1.3% of 792,118 pupils who sat for the exam passed with an A grade and a further 12.5% passed with a B grade (URT, 2015, 58–59). By any standard, primary education is not delivering; it is producing graduates with low levels of literacy and numeracy. Poor-quality primary education is bound to affect students' education at higher levels.

Access to secondary education increased significantly after the implementation of the Secondary Education Development Plan in 2004. Form 1 enrolment increased from 99,744 in 2003 to 147,490 in 2004 and to 180,239 in 2005. Total enrolment in Form 1 to 4 increased from 319,487 students in 2003 to 967,087 in 2007. In 2014, Form 1 enrolment has reached 588,873 students and Form 1 to 4 enrolment has reached 1,870,280 (URT, 2015, 3). Like primary education, enrolment in secondary education has made significant increases. More students are now attending secondary schools than ever before. However, the problem of quality remains.

There are no independent assessments of learning for secondary-school students, so we have to depend on the national examination performances. As in the PSLE, the performance of students in the Certificate of Secondary Education Examination is dismal. Although overall pass rates have improved in the last few years, most students pass only the lower division. The pass rate, which had dipped to all-time low of 43.1% in 2012, rose to 69.1% in 2014. However, more than half of those who passed obtained Division 4. Only 3.1% of the students were able to obtain Division 1 (URT, 2015, 68). Quality remains a concern.

Performance in math and science, the skills most needed by employers, is poor. Performance in math has always been dismal. In 2014, only 19.6% of students passed basic math in the CSEE exam, compared to 11.3% in 2012 (URT, 2015, 71). As math is the foundation of all the sciences and of engineering in particular, the prospects of the country producing the required number of engineers and people with high levels of technical expertise appear dim in the near future. In biology the pass rate was 48.3%, in physics it was 46.7% and in chemistry it was 56.7. Almost half the students failed these science subjects (URT, 2015, 71). The poor quality of basic education is matched by the emergence of a dual education system in the country, one for the children of the rich and one for the children of the poor.

Unequal Access to Quality Education and Skills Development

Poor-quality education leads to lack of skills, which leads to low-paid work, often below the poverty line. All too often, access to quality education, and thus to skills, is unequal. Children from rural areas, those from poor backgrounds, and female children are disadvantaged when it comes to accessing quality education. Poor education perpetuates and exacerbates the disadvantages of being poor, female or a member of a marginalised social group. Young people who grow up in poverty and exclusion are more likely to have had little education or to have dropped out of school (UNESCO, 2012). These youth have fewer opportunities to develop skills for jobs that pay well, which results in their further marginalisation in the labour market.

Despite the social policies in education followed in the early years of independence, one's residence, socioeconomic background and gender determines how well one does in school. Children from rural areas historically tend to perform poorly compared to their urban brothers and sisters. Girls, similarly, tend to perform poorly compared to boys. In the 2014 PSLE 60.9% of the boys passed the exam compared to 53.6% of girls. Twice as many of the boys obtained an A grade, 1.7% compared to 0.9% of the girls. Students obtaining better grades will join better secondary schools.

The ethos of Tanzania in the early years of independence was to create a society based on equality. As stated earlier, one of the first tasks of the government was to ensure that all children had equal opportunity to pursue education, depending on a child's capability. Racial, ethnic, religious and income barriers to a child's ability to access education were removed. Unfortunately, these barriers have re-emerged. Children are denied quality education based on religion and/or ability to pay. The emergence of private schools since the 1980s has created a dual system of education: good-quality, private schools for the elite and poor-quality schools for the poor.

The development of any country, Tanzania included, depends on the availability and effective utilisation of human resources, which in turn depends on the level, quantity and quality of education, especially vocational and technical education. The skills attained through formal and informal education improve productivity and enhance per-capita income of the individual and the nation at large. Human resources transform the economy as well as the society itself through wealth creation and the value added to primary production. Vocational training develops the skills of the individual human being, culminating in the accumulated knowledge and technical skill that are needed for national development. Skilled personnel constitute the most important resource for national development. The next section traces the development of vocational education and skills training and acquisition.

2.4 Technical and Vocational Education

Technical education refers to the academic and vocational preparation of students for jobs involving science and modern technology. It emphasises the understanding and practical application of basic principles of science and mathematics. Vocational education, on the other hand, refers to attainment of proficiency in manual skills. Technical education prepares students as technicians, for occupation that are classified above the skilled crafts but below the scientific or engineering professions. Technical occupations are vital in a wide range of fields, including agriculture, business administration, computers and data processing, education, environmental and resource management, graphic arts and industrial design, and health and medicine; technical educational curricula are correspondingly specialised over a broad range. In Tanzania, technical education is provided in post-high-school technical schools; degree education is provided at the university level while crafts training is provided in Vocational Training Centres, Folk Development Colleges and other post-primary and post-secondary schools.

Technical and vocational education in Tanzania is organised under three different umbrellas. Technical education is governed by National Council for Technical Education (NACTE). Technical education provides training opportunities for students who have completed four or six years of secondary education, preparing them as technicians who can be employed to

work in different sectors of the economy. Technical Education Training graduates are equipped to play roles requiring higher levels of skill, knowledge and understanding, in which they take responsibility for respective areas of specialisation as technicians, associate professionals and professionals, as appropriate. In 2011, there were 248 technical education institutions, out of which 139 were owned by different ministries and departments within the ministries. The rest were privately owned, mostly by faith-based organisations. NACTE ensures quality in these institutions. In 2011/12, 112,447 students were enrolled in the technical colleges, of whom the majority, 90,641, were in government-owned institutions. Nearly half of the enrolled students, 57,179, were in the social science, business and law fields. More than 5000 students were enrolled in engineering, manufacturing and construction fields and an additional 6612 in sciences (URT, 2012c).

Vocational education in various areas is provided by Folk Development Colleges (FDCs) and Vocational Education Centres (VECs). Folk education is essentially non-formal education offered in community-based colleges that are specifically intended to provide knowledge and skills to communities so as to enable them to employ themselves and hence effectively arrest poverty. Currently there are 52 FDCs located all over the country. Folk education is intended to solve a community's immediate problems related to social, economic and cultural development. It develops the personalities of individuals, their ability to think, feel and appreciate people's problems so that they can help others participate more fully in the social and economic activities of their community, as well as advances the knowledge of adults so they can make better decisions in personal and public matters, including cooperative endeavours. It promotes knowledge and advances skills in agriculture, handicrafts, domestic science and health science and involves learners in cultural activities. FDCs have in recent years run into severe financial constraints which have affected both the quality and quantity of the training (Redecker, Wihstutz and Mwinuka, 2010).

Vocational Education Training (VET) is provided by VECs. VET in Tanzania is defined to mean training leading to a skilled occupation. Learners in VET centres are hence pursuing competence-based training to become skilled workers for meeting the specific requirements of occupations, and upon successful completion they are awarded competency certificates – National Vocational Awards (NVA) Levels I–III for the relevant trades. Entry qualifications to the long VET courses vary from primary- to secondary-school education, depending on the course, and also through progression within the VET qualifications. VET graduates with NVA III may also be eligible for progression into TET.

In 2011 there were 121,348 students enrolled in FDCs and Vocational Training Centres (VTCs), pursuing training ranging from agriculture and food processing to printing. The most popular programme was ICT, which had 31,967 students, followed by automotive repairing, which had 23,356 students. Other courses offered were business administration, clothing and textiles, construction, electrical, hospitality and tourism, laboratory technology, mechanical and printing (URT, 2012c, 139).

The government has realised that although technical and vocational training has been expanding, it was doing so at a slower pace and thus was unable to meet the ever-growing demand for technical personnel of appropriate levels for the economy. The government also realised the absence of training programmes for preparing metallurgical technicians, metal production process controllers, chemical engineering technicians, chemical process

plant controllers, ICT user-support technicians, and interior design and decorator associate professionals, among others. The government has decided to develop a five-year programme, the Technical and Vocational Education Development Programme (TVETDP), to revitalise technical and vocational education and to meet the increasing demand of the expanding industrial sector (URT, 2013a).

2.5 University Education

In this section we will examine university education in terms of quantity and quality. The need for well-qualified graduates in relevant fields cannot be overemphasised. The Tanzanian government adopted the most recent Five-Year Development Plan 2011/12–2015/16, which aims at unleashing the growth potential through education and especially through higher education. The Five-Year Development Plan which ends in 2015/2016 aims at creating specific human resource capacity which includes training 88,000 engineers and architects, 64,000 medical, dental and veterinary scientists, 26,000 physical scientists and 320,000 teachers. These are gigantic targets for an economy like ours. These national targets require stakeholders in higher education to double the annual enrolment of students from the current figure of around 40,000 students to 80,000 students. Private-sector participation in higher education is to be encouraged.

Currently there are 32 universities in the country, of which 11 are public. Total enrolment in universities and university colleges was 218,959, of whom 144,157 (65.8%) were in public universities and 74,802 (34.2%) were in private universities The overall male–female ratio was 64:36, which has been constant for the last five years. The proportion of female students was higher, 42%, in private universities than in public universities, 33%. As far as total enrolment is concerned, university education is expanding at a fast rate. Enrolment increased by 9.7% in 2010/2011; by 22.8% in 2011/2012; by 20.9% in 2012/2013 and by 8.9% in 2013/2014. The growth rate in public universities in recent years has been impressive, increasing by 3.9% in 2010/2011; by 21.1% in 2011/2012; by 14.7% in 2012/2013 and by 11.6% in 2013/2014. Enrolment in private universities and colleges more than doubled between 2009/2010 and 2013/2014: from 33985 to 74802 (Gender disparity remains a problem in enrolment at the tertiary level. From 2009/2010 to 2013/2014 the female–male ratio remained 36:64.[1]

As discussed earlier, in order for the nation to achieve middle income country status, it will require a large number of STEM graduates. Enrolment in our universities does not reflect this priority. We may be producing large number of graduates whose skills are not needed for national development. In 2013/2014, out of 218,956 students only 56,476 (25.8%) were taking science-related courses. What is disturbing is the fact that the proportion of students enrolled in science programmes has fallen from 34.0% in 2006/2007 to 25.8% in 2013/2014. The largest number of these students, 15,270, were in science and ICT programmes. With respect to other science programmes, there were 12,600 in engineering, 13,124 in education science, 10,351 in medicine, 2867 in agriculture and 2263 in natural science. Not only is the proportion of STEM students lower than that of arts students, but their rate of increase is much lower than that of arts students. Between 2009/2010 and 2013/2014, the number of students enrolled in arts subjects increased by 90.4% compared to a 48.3% increase for the science students Fewer students enrolled in STEM fields at

[1] Data available at www.tcu.go.tz/images/documents/Enrollment_by_category.pdf.

the tertiary level is a reflection of number of students opting for science subjects at the secondary-school level. Despite the efforts made by the government to popularise and prioritise science education, students are not opting for science subjects. The proportion of female students in science subjects remained steady at around 30% between 2009/2010 and 2013/2014, and was around 36% in arts subjects.[2]

In recent years concern has been raised about the quality of higher education in Tanzania. It comes at a time of growing recognition of the potentially powerful role that universities can play in economic growth. This concern has been raised at several levels. There is public perception that quality has been compromised in the effort to expand enrolment in recent years. The notion of quality is hard to define precisely, especially in the context of tertiary education where institutions have broad autonomy to decide their own visions and missions. Any statement about quality implies a certain relative measure against a common standard; in tertiary education, such a common standard does not exist. Various concepts have evolved to suit different contexts, ranging from quality as a measure for excellence to quality as perfection, quality as value for money, quality as customer satisfaction, quality as fitness for purpose, and quality as transformation. Customer satisfaction with the quality of university graduates has not been flattering.

The Inter-University Council for East Africa (IUCEA) is a membership organisation comprising about 100 public and private universities in the five East African countries of Kenya, Tanzania, Uganda, Rwanda and Burundi. It recently commissioned a survey of employers in the five countries to seek their views on the employability of graduates from its member universities. The survey revealed some stark and disturbing facts. Between 51% and 63% of the graduates were found to be 'half-baked', 'unfit for jobs' and 'lacking job market skills'. The worst records were in Uganda (63%) and Tanzania (61%). At a time when great efforts are being made to increase student enrolment in higher education in Africa and when the acute shortage of highly skilled human resources is proving to be a handicap to growth and development, these findings are, to put it mildly, alarming (Mohamedbhai, 2014).

Universities take measures to ensure the quality of the programmes they offer. The Tanzania Commission for Universities (TCU) has provided guidelines on assuring the quality of education provided by institutions of higher learning, which all institutions have to adhere to (TCU, 2014). Use of external examiners, self-evaluation, student evaluation of courses and academic audits are some of the ways through which institutions ensure quality. Comparison between universities is another method of ensuring quality. For example, University of Dar es Salaam is the only Tanzanian university that has been listed among the 100 best universities in Africa. In a list dominated by South African and Egyptian universities, University of Dar es Salaam is listed as number 7 on the 2015 University Web Ranking/Africa and is ranked 10th on the African Economist ranking of the 100 top universities in Africa.

2.6 Adult Education and Apprenticeship Training

Passing on skills to the next generation through apprenticeship is the oldest way to train someone in a particular craft. It is quite common in Tanzania for tailors, blacksmiths, bricklayers or carpenters to have few young people around who learn from the masters. Usually the young man or woman who is being trained is a family member or a close friend.

[2] Data available at www.tcu.go.tz/images/documents/Enrollment_by_category.pdf.

Fees are not generally charged and few or no wages are paid. There is no fixed time for completing this kind of training, which may take anywhere from six months to two years, depending on the trade. The training method is learning by doing. This kind of training is carried out informally and has unfortunately not been documented.

In order to train young people for employment or self-employment in rural areas, the government established FDCs and Post-Primary Technical Centres (PPTCs). In addition, the number of NGOs and private training businesses has increased in recent years. Paralleling these programmes, the informal sector has continued to train young people through the apprenticeship system. Parents and young people consider training in terms of a socioeconomic hierarchy. For those who fail to progress to secondary-school education, their first choice is accredited training at a VTC or FDC, followed by non-accredited vocational training from a PPTC and informal-sector apprenticeship (Redecker, Wihstutz and Mwinuka, 2010).

The establishment of FDCs was the most ambitious undertaking to train adults to acquire some basic skills. The FDCs emerged in 1975 as adult post-literacy institutions, providing programmes related to the needs of rural communities. Initially the FDCs were known as rural farmers' training centres. There are 52 FDCs in the country which are providing craft knowledge and skills in different fields of occupation, including carpentry, brick/block laying, electrical, auto mechanics, farming and home economics. Current training objectives relate mostly to the needs of the formal sector instead of the targeted needs of the informal sector. Also, while the target group of the FDCs is supposed to be adults, most of the trainees are young primary-school leavers (Redecker, Wihstutz and Mwinuka, 2010).

Traditional apprenticeship can have a positive effect on employment and earnings. Apprenticeship is cost-effective mainly because it has greater efficiency in the acquisition of skills on the job. Learning by doing under actual production conditions, rather than off-the-job formal training modes where the trainee spends most of his/her time at the training institution, ensures sound mastery of skills. Also, trainees spend relatively limited periods of time in formal instruction. Thus, during most of the duration of the apprenticeship, they are productively employed so that both direct training costs and income foregone (opportunity costs) are generally much lower than at alternative training institutions.

In Tanzania there have been several examples of apprenticeship training for specific sectors, some documented, most not. We will look at a couple of examples of such training to see their potential for training youths for employment. The Certified Apprenticeship Programme in Hotel Operations was officially launched in Dar es Salaam to enhance skills and entrepreneurship for improved labour productivity and employment creation. According to the International Labour Organisation (ILO), the programme was aimed at upgrading skills and improving service delivery in the hotel sector. The initiative was a result of a two-year effort between the Tourism Confederation of Tanzania (TCT), the Hotels Association of Tanzania (HAT) and the National College of Tourism (NCT) to develop the programme, with technical expertise and financial support from the ILO. The programme was financed through the United National Development Assistance Plan (UNDAP). In this programme 60% of the training takes place at workplaces (i.e. seven major hotels participating in the programme) and 40% at the NCT. The programme was designed to bridge the skills gap that exists between the tourism institutions and the hotel industry. Formal apprenticeship is a training

system in which the industry assumes responsibility for training in close collaboration with training institutions. This method of training has been found very effective in ensuring that the training institutions produce graduates with the skills required in the specific sector. In the arrangement the apprentices not only learns at a college but also on the job.

Apprentices receive training in all hotel departments so that they will gain a broad understanding of hotel operations before specialising in one field. The pilot formal apprenticeship programme has demonstrated the provision of demand-driven skills training through viable public–private partnerships (PPPs). The apprenticeship curriculum runs for two years, with apprentices aged between 17 and 25 years rotating among all hotel departments. The programme is also aimed at actively engaging employers in training as part of ensuring that graduates possess skills relevant to the labour-market requirement in the tourism sector.

This creative program provides an opportunity for young apprentices to obtain relevant skills, to combine work and learning and to reduce the school-to-work transition gap while improving the productivity and employability of young people. It also allows the hospitality sector to contribute to the development of locally grown skilled workers, thereby reducing the cost of doing business through retraining or employing foreigners (Tourism Confederation of Tanzania, n.d.).

In another project, VETA and Handwerkskammer in Hamburg, Germany, joined forces to help Tanzania to create a skilled labour force, and to provide youths with easier access to the labour market. The training happens both at the VETA centres and in the real working environment as an employee at the company. The project is currently in the pilot phase, which will last for three years. The pilot phase involves three groups. Sixteen apprentices each in auto mechanics and electrical installations are receiving training in Dar es Salaam and an additional 16 in hospitality will be trained in Moshi. Tailor-made training programmes were designed in consultation with representatives of the industries during special workshops. The first workshop was held in Dar es Salaam where representatives from ALAF, CFAO Motors, Noble Motors, the Police Auto-mechanic Workshop, Scania Motors, Serengeti Breweries and Twiga Cement attended the workshop. The second workshop was held in Moshi where youths were trained for the hospitality industry. Hotels participating in the dual training were VETA and partner hotels. Dual or alternating training is done at the employment site and VETA centre. To be successful it is important to have a strong cooperation between VETA and employers.

Apprentice training has several advantages. Perhaps the most important is that the training is focused on the skills required for carrying out the task that a person is employed for. For the trainee, having a paid job is an added advantage. As technology develops, the skills required become more and more complex and a deeper technical knowledge becomes necessary. With ever-changing technology and skills needed, institution-based training has limitations.

(Handwerkskammer Hamburg, n.d.).

3. KEY LESSONS FROM THE EXPERIENCES OF OTHER COUNTRIES

In this chapter we will examine paths taken by Newly Industrialised Countries (NICs), countries that became industrialised after the Second World War. We will look at the economic history of Korea and Singapore. Both emerged from colonialism as poor, undeveloped countries. It is through sheer hard work, good policies and good governance that they have become leading industrialised nations in a short period of time. These countries transformed their educational systems to ensure that they generated highly skilled and disciplined workers to drive the industrialisation process. There are great deal of similarities between these two cases. In both countries, the state played a central role in determining the industrial policies and supporting established industries. The state was also responsible for devising education systems that supported the manpower needs of the emerging industries.

3.1 Industrialisation Process

After the Second World War a number of developing countries managed to rise to the level of competitors on the global market of mid-technology industries. This was the case with China, India, Indonesia, South Korea, Malaysia, Taiwan and Thailand in Asia; Argentina, Brazil, Chile and Mexico in Latin America; and Turkey in the Middle East. Amsden (2001) argues that poor countries, for the first time in history, managed to industrialise without proprietary innovations. This late industrialisation took place through purchase of technology from the old industrialised countries (Amsden, 2001, 2). Common to all these successful industrialisers was an active developmental state where the state controlled distribution and the market, and industrial policies based on various degrees of controlled import substitution and export promotion. This saw the use of different protectionist policies, such as tariff barriers, quotas, industrial licensing and subsidies, in an effort to move their economies from primary commodities towards manufacturing (Chang, 2006). Instead of following the old formula of free trade and comparative advantage, these countries adapted the strategy of protectionism, especially of new industries. Infant industry protection has played a crucial role as a policy tool, and as Chang (2002) argued, no country has successfully industrialised without protecting its new industries.

Shafaeddin (2000) and Chang (2002) argue that industrialisation is not possible by following liberalisation policies. Historical experience shows that economic development requires protectionist policies, at least at an early stage (Shafaeddin, 2000; Chang, 2002; 2006; 2007). Trade could well have played an important role at early stages, but not free trade. Studies show the role of strategic trade intervention by the government in achieving manufacturing growth, upgrading of technology and industrial deepening in the East Asian newly industrialising countries (Wade, 1990; Lall, 2003). Evidence shows that sustainable economic development requires development towards manufacturing (Chang, 2002; 2007). Manufacturing industries can only be sustained in the initial stage through state protection. In a country with little or no experience in manufacturing, industrialisation will not take place "according to the 'natural cause of things' in the face of foreign competition" (Shafaeddin, 2000, 8). In addition, since establishing new industries involves great risk, there have to

be extra incentives for the producer. If the industry is open to foreign competition from the onset, the new industry will be ruined and the producers will suffer. In this way, the market will not succeed in promoting industrialisation in the least developed countries (Shafaeddin, 2000). Chang (2007) succinctly states:

The problem is this – producers in developing countries entering new industries need a period of (partial) insulation from international competition (through protection, subsidies and other measures) before they can build up their capabilities to compete with superior foreign producers. If they are exposed to too much international competition too soon, they are bound to disappear. If Korea (as well as Taiwan and Singapore) had followed the logic of trade liberalisation, it is unlikely that they had achieved the developmental success they did (Chang, 2007).

As Chang (2007) states: "Protection does not guarantee development, but development without it is very difficult" (82).

Korea

At the end of the Korean War (1950–53), South Korea was one of the poorest countries in the world. The period between 1953 and 1961 is known as the recovery period. The main concern of economic development at this time was to increase crop production and to build Import-Substitution Industries (ISI) producing consumer goods such as food and clothing. During the period the government made massive investments in education, which provided a well-educated labour force that would form the backbone of the labour-intensive industries that were established. Although the basic economic infrastructure was under construction, there were many problems related to underdevelopment, such as poverty, a high birth rate, a high unemployment rate, a low savings rate, and a trade deficit due to the importation of raw materials and many industrial goods without any significant export industry. These ISI were subsidised and protected from competition from imported goods through tariffs.

Korea soon realised that sustained growth was not possible without developing Export-Oriented Industries (EOI). The first Five-Year Development Plan (1962–66) led to a remarkable transformation of the economy that catapulted Korea to the status of an NEC (Harvie and Lee, 2003). The Korean government actively sought foreign aid to finance the development plans. The government adopted the policies to promote industrialisation and export activities and gave incentives to companies that made large investments and those who achieved high levels of exports. The government's export-oriented policies were successful owing to the readily available labour force at home and cheap raw materials, including petroleum. In this initial stage of industrialisation, labour-intensive light industry, especially textiles, was the leader. The basic philosophy during the period was 'export first' or 'nation building through export promotion'. The government set export targets for firms and attaining or exceeding these targets was regarded as the height of achievement for businessmen and public officials in the Ministry of Trade and Industry. If the firms succeeded in achieving the set goals they obtained numerous benefits such as preferential credit and loans, administrative support, tax and other benefits (Harvie and Lee, 2003, 261).

The period between 1973 and 1979 was marked by the government pushing capital-intensive heavy and chemical industries. The government believed that sustained economic

growth required heavy investment and a strong government which could forcefully carry out development policies. The Korean government shifted its focus from light industries to the promotion of heavy and chemical industries. The government's involvement in economic planning had expanded a great deal since the 1960s. The government came to control all (Kim, 2000, 98) financial institutions and made decisions on every aspect of the national economy, from investment and distribution to consumption. Korean success in achieving rapid industrialisation was not without consequences. It led to the concentration of wealth in a few big-business conglomerates as the government favoured large corporations in its quest for rapid economic development. As a solution, the government began to privatise national business and chemical enterprises by seeking private investments and promoting financial liberalisation and privatisation of banks. The government attempted to induce fair competition among private business corporations and enacted fair trade legislation. During the 1990s the government's policy changed from a protectionist position to an open-market position.

Singapore

Singapore was a British colony whose economy during the colonial period was heavily dependent on entrepot trade. Singapore became self-governing in 1959 and an independent state after separating from Malaysia in 1965. On achieving independence, the government's priority on the economic front was to find the quickest and most effective way to develop an industrialised economy. To compete as a viable economic entity, the immediate task was to break away from the long dependency on entrepot trade and embark on an export-oriented industrialisation strategy. This would ensure the survival of the small city-state. Since the 1950s, industrialisation was widely acknowledged by the pro-capitalist, independent states of Southeast Asia, such as Korea, as the key to survival and economic growth.

The initial response of the Singapore government was to focus on establishing import-substitution industrialisation aimed at the reduction of dependence on imported goods. Basically, it involves the small-scale production of consumer goods whose production requirements are compatible with conditions, such as abundant unskilled labour and unsophisticated technology, existing in countries without previous industrial experience (Goh, 2005, 13). ISI led initially to high growth rates but soon the Singapore government realised that the strategy would not lead to sustainable growth. The predominant industry was the shipbuilding and repair industry which was largely in the hands of governmental and public bodies, such as the Singapore Harbour Board and the British Naval Base. The small manufacturing sector consisted mainly of light engineering, assembly of vehicles, marine engineering, printing and processing. Though employment in the manufacturing sector grew from 22,692 in 1955 to 44,295 in 1961, manufacturing development was slow and stagnated at about 12% of gross domestic production in 1960.

The development strategy adopted by the Singapore leaders gradually shifted towards export-oriented industrialisation (Goh, 2005, 14). But the task of expanding manufacturing activities for a trading port was not expected to be smooth because of the "dearth of skilled labour in Singapore". The year 1968 was a watershed in terms of a shift in industrial strategy to more export-oriented manufacturing activities. To support the EOI strategy and given the lack of natural resources, the development of the country's human resources

was of paramount importance for the government. To achieve this end, an education system that would support the development of a literate and technically trained workforce was introduced.

3.2 Education Policies for Industrialisation

The nature of industrialisation and national development is closely tied to a country's national education system. Education provides youth with the skills necessary to drive the industrialisation process. We will briefly examine the education systems in some countries which have achieved rapid industrialisation. One thing common to all these countries was heavy emphasis on technical and vocational education. Technical and vocational education was developed to support the needs of industry. In these countries work-skills development is to a large extent the foundation of this growth, with technical and vocational education and training (TVET) being an important factor in the economic development of these countries. Rapid industrialisation in these countries resulted in a high demand for a skilled workforce, causing a rapid expansion of the education sector.

South Korea

The Republic of Korea went from being poor to wealthy in just 30 years, partly by emphasising and planning for skills development. The state upgraded the skills of the whole population by achieving universal primary, then universal secondary, education. It then focused on supporting industries with skills training. In short, the state played a key role in matching skills supply to demand. South Korean education has been affected by its history. During the Japanese occupation Korea had a fairly limited education system. Before the end of war, only Japanese were allowed to teach. When the Japanese left at the end of the Second World War Korea had no teachers and no one with the level of education required to be a teacher. Seventy-eight per cent of the population was illiterate. South Korea, in 1970, had a per-capita income of around $200. Within four decades South Korea has built one of the most successful education systems, resulting in one of the most highly educated and skilled workforces that now staffs at every level some of the world's leading consumer electronics companies, automobile manufacturers and builders of giant super tankers and container ships.

The quality of education is comparable to the best in the world. In the 2012 PISA assessments, South Korea ranked 5th in math, 5th in reading and 7th in science. The average score in math was 554; 536 in reading and 547 in science, compared to the OECD average of 494 in math, 496 in reading and 501 in science (OECD, 2014). This remarkable success can partly be explained by the Korean culture of hard work, reverence for education, frugality and strong family structure. Success was achieved through sheer determination of the Koreans to build a world-class country, and the commitment of every citizen to achieve this. Education was, in the minds of the Korean people, a central part of that grand design from the start (Sorensen, 1994).

By the mid-1960s, Korea had managed to eliminate widespread illiteracy. Ninety per cent of the elementary school cohort was in school by the same time. The same was true for middle schools by 1979. South Korea has one of the highest higher education enrolment rates. Nearly 97% of 18-year-olds graduate from high school and a staggering 81.3%

advance to institutions of higher learning (Rogers et al., 2009, 3). Only five countries in the world have a higher proportion of the world's total number of adults with a tertiary education, and most are far larger than South Korea. So, in a few short decades, South Korea has managed to go from massive illiteracy to topping the global charts in both quantity and quality of education.

Two features of the Korean education system stand out. One, they have opted for an uncompromisingly egalitarian system, rejecting different education systems for different classes. Two, Korean education is highly centralised: the Ministry of Education controls all aspects of education. The Basic Education Law, passed in 1949, still provides the core structure of the system. Six years of free compulsory education, beginning at age 6, is followed by three years of middle school, followed by three years of high school, followed by four years of college. High schools are divided into academic and vocational schools. In 1995, some 62% of students were enrolled in academic high schools and 38% in vocational high schools. The high school curriculum is standardised; both boys and girls study technology and domestic science.

By 1959, the final year of the Six-Year Plan for the Completion of Compulsory Education, enrolment in primary school rose to 96.4%, and it reached 100.0% in 1970. Universal primary education matched the ISI strategy Korea had adopted in the early years, which did not require highly trained manpower. Subsequently, other levels of education, secondary to tertiary, expanded sequentially. Secondary education started its expansion after primary education was universalised and the number of primary-school graduates rapidly increased. Similarly, higher education started expanding after the number of high school graduates rapidly increased and competition for college entrance intensified. Secondary- and higher-education enrolment rates were only 27% and 4. 7% respectively in 1960, when the primary-education enrolment rate was 96%.

Secondary education started to grow at a faster rate in the 1960s. While primary education was universalised in the 1950s, the enrolment rate of middle-school education was only 41.4% in 1966 and 50.9% in 1970, and the high school enrolment rate was 26.4% and 27.9% respectively. However, it increased to 95.0% for middle school and 63.3% for high school in 1980. The expansion of middle-school education was achieved with the abolition of the middle-school entrance examination. As primary education became universalised and primary-school graduates massively poured out, the competition for middle school entrance became severe, yielding various social problems.

Korean education, as stated earlier, is closely tied to its industrialisation processes. The government expanded high-school education opportunities by increasing the enrolment quota, establishing new schools, and encouraging the private sector to establish new schools. At the same time it made an effort to equalise various educational conditions of high schools (Kim, 2000, 103). During the 1970s, the government attempted to consolidate vocational and technical education at the high-school level. Accordingly, the number of vocational high-school students greatly increased and the schools were able to secure students of higher quality than ever before. From 1970 to 1980, the number of vocational high schools increased by 124 schools, an increase of 24.5%. The number of students increased at an average annual growth rate of 10.5%. Vocational high schools expanded at a very fast rate, particularly during the second half of the 1970s. The proportion of

vocational high-school students among the total number of high-school students rose from 42.3% in 1975 to 45% in 1980. The proportion of technical high-school students among the total number of vocational high-school students increased from 25.0% in 1970 to 26.4% in 1980 (Kim, 1991).

Owing to the government's effort to strengthen vocational training, including the legal measures, public, authorised and in-plant training institutions trained and supplied craftsmen in the short term. More than 310,000 craftsmen were trained in these institutions during the third Five-Year Economic Plan (1972–76) and about 495,000 during the fourth Five-Year Economic Plan (1977–81). However, the accomplishments of these training institutions as well as vocational high schools have been decreasing since the 1980s, with an increase in college-going youth.

The expansion of secondary schools, particularly vocational high schools, contributed to satisfying the industrial demand for semi-skilled labour and craftsmen required in the heavy and chemical industry-centred industrial structure. In 1960, 80.4% of manufacturing workers had primary education or less and only 18.5% completed secondary education. However, the proportion of those workers who completed secondary education continually increased to 46.9% in 1975 and 58.5% in 1980 with the reduction in the proportion of primary-school graduates (Kim, 1989). Vocational high schools offer programmes in five fields: agriculture, technology/engineering, commerce/business, maritime/fishery and home economics. In principle, all students in the first year of high school (10th grade) follow a common national curriculum; in the second and third years (11th and 12th grades) students are offered courses relevant to their specialisation. In some programmes, students may participate in workplace training through cooperation between schools and local employers.

Junior colleges are the training ground for technicians who staff the Korean industries. In order to support industries, educational institutions have to continually adapt their programmes to the world of work, comparing and contrasting them in light of some key questions, such as student employability, institutions' adaptability to changing labour-market needs and the role of the state in shaping these institutions. In Korea vocationally oriented higher-education institutions are state-run, with the government keeping tight control over curricula, admissions and funding. In South Korea these junior colleges, *jeonmun daehack,* are highly regulated by the state and are designed to graduate technicians with solid theoretical and practical skills (Rogers et al., 2009, 1).

The state's intervention, by linking the educational sector to the larger industrialisation policy, is expressed most apparently in the higher-education enrolment quota policy. The Korean government has tightly controlled the college enrolment quota until recently. It determined the quota by the department level of each college or university, considering the social demand of students and parents and the industrial demand (Kim, 1994). From liberation to the 1950s, higher education greatly expanded due to the government's *laissez-faire* policy of enrolment quota increase. Higher education greatly expanded during the first half of the 1980s owing to the policy of introducing the graduation enrolment quota system and the policy of expanding the college enrolment quota. In 1980, the enrolment rate of higher education exceeded the world average, becoming higher than any other nation's except USA in 1985.

The main mechanism for the development of industrial technology in Korea has been the transfer of technology from industrialised countries in the form of plants and licensing. However, technology can only be correctly chosen when Korea herself has the capability to make relevant decisions and to negotiate with the exporting countries. Furthermore, imported technology can be adapted properly and improved only when the country has a specific level of indigenous research and development (R&D) capability. As the government started to build up the legal and institutional infrastructure for the development of science and technology in the late 1960s, it established and financed various research institutes. However, it was not until the 1980s that R&D became active. R&D expenditures as a percentage of GNP increased from 0.39% in 1970 to 0.58% in 1980, and from 1.88% in 1990 to 2.61% in 1994 (Lee, 2010).

Singapore

Singapore realised that it needed skilled manpower for its industrial goals. To ensure the country trained the required labour the government established vocational secondary schools for the first time in 1964, with a modest enrolment of 4910 pupils. Most of the pupils who joined these vocational secondary schools were those who had failed to pass the primary leaving examinations to enter academic secondary schools. The curriculum of the vocational schools consisted largely of vocational subjects such as woodwork, domestic science, art and crafts and technical drawing. By 1968, it was becoming increasingly apparent that the output of technically trained workers produced by the school system would not be sufficient to meet the requirements of new industries, given the small number of students who were in technical and vocational streams. In 1968, out of the 144,000 students in secondary schools only some 18,000 were in technical and vocational streams, so the government accelerated the plans for the expansion of technical education. In June 1968, the government established a Technical Education Department which was set up in the Ministry of Education, and from 1969 all male lower secondary pupils were required to have two years of exposure to technical subjects while girls were given a choice between technical subjects and home economics (Boon and Gopinathan, 2006).

All available training facilities were used by the Technical Education Department to turn out skilled workers, such as welders and machinists, to service the shipbuilding, oil refinery, electro-chemical, electro-mechanical, precision engineering, metalworking and woodworking industries. From 1970 to 1973, for example, 1789 trainee welders received formal technical training. External support from United Nations Development Programme (UNDP) and some other governments such as Japan, Britain and France was instrumental in establishing several Vocational Training Centres (Boon and Gopinathan, 2006).

Teachers' knowledge in the vocational and technical institutions was constantly upgraded through training and retraining to ensure that these institutions developed up-to-date skills among their graduates. The number of technical teachers increased from 425 in 1968 to 1950 in 1972. In 1968, some 4000 teachers received training in metalwork, including fitting and sheet metal, woodwork, printing, motor mechanics, radio and television servicing and electrical fitting and installation. Industrial-oriented education to produce the manpower for industrial development continued well into the

1970s. Enrolment at the secondary level continued to grow, rising from about 148,000 in 1969 to 176,000 in 1979. Enrolment in Vocational and Industrial Training Board (VITB) institutes also rose from 2800 to 14,000 during the same period. By 1976, close to 20% of the secondary-school population was receiving technical education. Development of vocational education was not limited to the secondary level. At the tertiary level, the total intake at Singapore's two main polytechnic schools at this time – Singapore Polytechnic and Ngee Ann Polytechnic – rose from about 3500 in 1966 to about 11,000 in 1980 (Boon and Gopinathan, 2006).

As the young continued to show an aversion towards blue-collar jobs, the danger of the country not possessing a sufficient pool of technically skilled local workers became obvious. In 1992 the VITB was totally revamped and renamed the Institute of Technical Education (ITE). Sprawling ITE campuses, with excellent educational and sports infrastructure and cutting-edge technological support, were built in several locations throughout the island. Scholarships were also made available for top ITE graduates to pursue diploma courses in the polytechnics. Market demand for the well-trained 'ITE graduate', especially by some 650 participating companies under ITE's apprenticeship scheme, led to a rise in their starting salary, from an average of about US$700 per month in 1994 to about US$1200 per month in 2005. There were also many 'success stories', highlighted in the newspapers, of ITE students making it to the polytechnics and eventually acquiring university degrees. In short, although enrolment in these training schools is still limited to those who find it difficult to go the academic route, the image of vocational training has totally changed for the better (Boon and Gopinathan, 2006).

3.3 Research and Development

R&D is an integral part of economic development. A firm or a nation needs to invest in R&D to remain competitive in the modern economy. Research and development consists of four types of activities: basic and applied research, and product and process development. *Basic research* is original experimental work without a specific commercial aim, frequently done by universities. *Applied research* is original experimental work with a specific aim. *Product development* is the improvement and extension of existing products. *Process development* is the creation of new or improved processes. In the modern world the shelf life of new products is getting shorter; in order for a country or firm to be competitive globally, it has to produce different, better or cheaper products. Applied research is mostly carried out by national universities while product development is carried at the firm level. In some cases the firm outsources R&D activities to universities or to other countries. In all cases, R&D activity requires highly qualified scientists and engineers.

New product design and development is more often than not a crucial factor in the survival of a company. In an industry that is changing fast, firms must continually revise their design and range of products. This is necessary due to continuous technology change and development as well as other competitors and the changing preferences of customers. Without an R&D programme, a firm must rely on externally purchased technology through strategic alliances and networks to tap into the innovations which have been done by others. Table 5 shows the expenditure on R&D by developed economies.

TABLE 5: EXPENDITURE ON R&D BY SELECTED DEVELOPED COUNTRIES

Country	Expenditure on R&D (billions $)	As % of GDP	Per-Capita Expenditure $	Year
USA	4,505	2.8	1,442.51	2013
China	258	2.0	270.56	2013
Japan	163	3.4	1,344.31	2013
Germany	92	2.9	1,313.46	2013
South Korea	61	3.6	1,518.47	2013

Source: R&D Magazine, 2013, December, 7.

Table 5 shows that Korea, in terms of proportion of GDP and per capita, spends more money on R&D than any other country in the world. Korea is a good example to look at to see how investment in R&D has supported economic development. The Republic of Korea has shown a very successful model of economic progress and social development through government intervention. Its R&D system has contributed to this success through strategic acquisition of foreign technologies and a national capacity-building process. The R&D activity in Korea shows two interesting trends: first, the amount of funding spent on R&D and second, the source of funding for these activities.

The total R&D expenditure in the Republic of Korea has continued to increase except for the period of financial crisis from 1997 to 1999, and has risen dramatically from US$4 million in the early 1960s to more than US$27 billion in 2006 to US$91 billion in 2014. The R&D expenditure was 3.23% of the gross domestic product (GDP) in 2006, increasing to 4.3% in 2014. The government was the dominant source of R&D expenditure before 1980. Since then, the private sector has continued to expand its contribution, registering 76% of the total R&D expenditure in 2006 against 24% by the government (Lee, 2010).

Of the total R&D expenditure, companies spent 77.3%, public research institutes 12.7% and universities 10.0%. Public research institutes were a dominant user of R&D funds before 1980, but the share of companies' R&D expenditure dramatically increased thereafter. Universities' share almost caught up with the share of public research institutes in 2000. Large companies have always led R&D investment in the private sector, while small and medium enterprises' (SMEs) R&D investment has slightly increased. Venture companies invested almost the same amount as SMEs in R&D in the 2000s. In 2006, 65.0% of the total R&D expenditure was invested in development, 19.8% in applied research and 15.2% in basic research. In the 2000s, basic research has shown higher growth rate than that of development, but the dominant position of development has not changed. Government R&D investment has also increased in the 2000s, to almost US$9 billion in 2006. Public research institutes have spent more than 50%, universities 21.7% and companies 17.2% (Lee, 2010).

The South Korean government has, since 1966, supported applied research through a major research and development centre, the Korea Institute of Science and Technology (KIST). The Ministry of Science and Technology, established in 1967, has carried out a national R&D programme since 1982 to develop long-term, large-scale high technologies

that are essential for improving South Korea's comparative advantage in international trade. The programme is carried out through joint participation of industries, universities, and government-funded research institutes. The Korean Science and Engineering Foundation (KOSEF) modelled after the National Science Foundation (NSF), supports basic research. Like the NSF, South Korea is establishing Science Research Centres and Engineering Research Centres at universities around the country for the common utilisation of advanced R&D facilities. The Daeduk Science Town, 150 kilometres south of Seoul, has 50 research institutes and shared facilities. South Korea also strives for regional distribution of research facilities and has established several smaller R&D complexes: genetic engineering in the centre (Suweon), new materials in the southeast (Ulsan), and fine chemistry and precision machinery in the southwest (Hanam).

South Korean firms have shown an ability to adapt foreign technologies, acquired through licensing agreements, to their production requirements. This would not have been possible without their R&D capability. Half of the approximately 1000 research institutions in South Korea are in private industry and half of these are heavily concentrated in the ten largest *chaebol* (industrial conglomerates), particularly the electronics and chemical industries.

4. BRIDGING THE GAP IN SKILLS AND PRODUCTIVE CAPACITIES – THE NEED FOR REORIENTATION OF SOCIAL POLICIES

Our discussion shows that Tanzania is unlikely to attain middle-income country status by 2025 as envisaged in Vision 2025, unless drastic measures are taken to improve education in general and skills development in particular, in terms of both quantity and quality. There are three basic problems facing the education sector. These are:

1. The poor quality of education;
2. An insufficient number of students opting for and succeeding in science subjects;
3. Inequalities in accessing quality education.

4.1 Teachers are Central to Developing Skills

Unqualified Teachers

The major problem with Tanzanian education is its poor quality. Most pupils completing primary education are unable to read and write and do not possess basic numeracy skills. Studies have shown that employers were not satisfied with their workers' presentation, problem solving, initiative and analytical skills. One study found that employers had very negative attitude towards their workers' literacy and numeracy skills. Almost two-thirds of respondents claimed that none or few of their workers were literate, 80% claimed that none or few of their workers were numerate, and 90% respondents stated that none or few of their workers had IT skills.

Central to poor quality are under-qualified and incompetent teachers. The problem with and of teachers has historical roots. Many Tanzanian writers (Leshabari and Masesa, 2000; Rajabu, 2000) identify the push for UPE in the 1980s as the major cause of the deterioration in quality at all levels of education in Tanzania. Education for all caused a high demand for teachers, to the extent that there were not enough secondary graduates to supply the demand, and primary teachers were drawn from populations who had not attended secondary school and who had not done well in their primary-school examinations. These teachers were categorised as Grade C teachers who had received very little training and did not possess the content knowledge required for them to teach a particular subject effectively.

By the end of the twentieth century the quality of the education system had reached a crisis point (Kuleana, 1999; Galabawa et al., 2000; Lwaitama et al., 2001). Schools lacked sufficient classrooms, furniture and textbooks. Fewer than half of teachers met the Ministry's minimum qualifications. Classrooms were overcrowded, teaching methodology was authoritarian and harassment of pupils, including sexual harassment, was common (Rajani, 2001). The level of absenteeism among teachers was high (Kuleana, 1999).

The decline in quality at the primary level had repercussions throughout the education system. Even with the exceptionally low transition rates from primary to secondary schools, entrants into secondary education generally had low levels of competency in key skills (Malekela, 2000). Poor fluency in English greatly inhibited the quality of learning in secondary schools (Roy-Campbell and Qorro, 1997). The decline in standards of students' communication skills was even noted at the university level (Cooksey, et al., 2001). The limited secondary education system led to a very small pool from which to draw teachers for both the secondary and primary levels. Many of those who went into teaching had passed through an impoverished education system, and so a cycle of poor teaching was perpetuated.

In terms of quality of teaching, there has been a prolonged, vicious cycle of poor educational quality in primary and secondary schools, producing school leavers with weak subject knowledge who have gone into teaching and perpetuated the same teaching methods that they were exposed to themselves. Teacher-training institutions have struggled to fill their courses and as a result have taken on trainees with low grades. In practice this means that many trainees lack understanding of the fundamental concepts that they are expected to teach.

Reluctant and Incompetent Teachers

The teaching profession has gone through a sharp downturn since the late 1980s. In the 1990s the profession seemed to have a high status. A study done by Cooksey, Galabawa and Ishumi (1991) showed that the major reason given by teachers for joining the teaching profession was "to help build the nation" (7). Surprisingly, in 1990, 76% of the teachers saw teaching as a respected profession, and nine out of ten respondents said salary was not an important consideration. This situation seems to have changed drastically over the last two and half decades. Low status and poor living and working conditions of teachers are deterring many students from the profession. A typical recent answer reflecting the changed environment was provided to Mkumbo (2012) by a teacher in Singida, who said:

People join this profession [teaching] as a last resort; they have not been able to find anything else meaningful in their life and, of course, teaching profession is the only remaining option. I am a typical example; I'm here because my Form six results were miserable; I wanted to do Economics, but my grades couldn't allow me, otherwise I would have never been a teacher.

Students join the profession because of poor grades, grades so low that they cannot join other programmes. Those who join the profession often lack adequate content knowledge of the subject they teach. A study by the World Bank found that only that one in ten managed to complete all the questions on the primary language curriculum. There was slight difference between rural and urban teachers. Thirteen per cent of the teachers in rural areas, and 5% of the teachers in urban areas completed all the questions correctly. For mathematics, the performance was slightly better, with 75% of the teachers managing to complete all questions on the primary mathematics curriculum. Differences between teachers in rural and urban areas were not significant.

Low Accountability of Teachers

This is evident in their behaviour at school. A Service Delivery Index (SDI) study by the World Bank (2013) found that on any given day 23% of teachers – 20% in rural areas and 36% in urban areas – were not in school (16). Even when teachers were in school, 53% of them were not in classrooms at any given time. Teacher absenteeism was much higher in urban areas, where 68% were not in class compared to 50% in rural areas. On average pupils were taught for only 2 hours and 4 minutes out of required 5 hours of teaching. In rural areas pupils were taught for 2 hours and 11 minutes compared to 1 hour and 24 minutes of teaching in urban areas.

Inappropriate Teaching Approaches

A study (Semali and Mehta, 2012) on the teaching of science in secondary school found that science practical classes were rare. Even when teachers conducted practical, most of the students just watched others complete experiments. Teaching and learning occur on a theoretical rather than practical basis. Furthermore, the survey identified several critical issues:

1. The teachers interviewed observed that the laboratories in which they taught science lacked equipment and chemicals.

2. Teachers displayed shallow knowledge of science and were incompetent to teach science.

3. Motivation to pursue science was low. The perception seemed to be that those who taught science subjects received unfair compensation relative to the effort and time required for preparing laboratory exercises and experiments.

4. Often, the perceptions identified science as a 'hard' subject, and attitudes generally discouraged women from taking science subjects.

5. Indigenous science accrued little value despite many students' extensive familiarity with traditional remedies for disease in both humans and animals. Little effort extends to validating this heritage knowledge. Challenged by all these problems, the respondents stated that they resorted to tailoring teaching to the national examinations.

Poor Working Conditions

Working conditions are poor. Teachers have to deal with large numbers of pupils in class. Although the pupil–teacher ratio (PTR) in both primary and secondary schools has improved in recent years the numbers are still large. Most schools, both primary and secondary, lack of an adequate number of classrooms. The World Bank (2013) study found that on average there were 74 children per classroom: 70 in rural areas and 92 in urban areas. BEST (URT, 2012c) data show that there are 111,661 classrooms available for 8,247,172 pupils, giving a pupil–classroom ratio (PCR) of 1: 74. There are large regional variations in the PCR: Kilimanjaro has a PCR of 1:43 compared to 1:77 for Rukwa. There

are many schools, especially in urban areas where the ratio is much higher. Teaching approaches that teachers learn are mostly ineffective in such large classes. Schools also lack textbooks. The number of schools with water and electricity is low.

4.2 Dry Pool: Low Enrolment in Sciences

Tanzanian schools, especially secondary schools, are not producing an adequate number of students with science and math background. A 15–20% pass rate in mathematics (URT, 2015) means that more than 80% of students are incompetent in science and technical areas. This should be a matter of concern for the country because we are not going to meet the demand for employees in STEM fields unless this issue is resolved.

4.3 Persistent Inequalities

We have shown that there are vast inequalities that have emerged as a result of privatisation of education, from pre-primary to university level. Although not all private schools are of good quality, we have shown that top schools, at both the primary and secondary levels, outperform public schools in national examinations. The rural–urban gap in performance persists. We are putting children of the poor, of those who reside in rural areas, at a disadvantage in the labour market. The Korean example shows that it is possible to provide quality primary and secondary education for all children.

4.4 Inadequate Provision of Technical Education

Technical education does not appeal to our students; most of them aim for university education – so much so that many of the existing technical colleges began to turn themselves into universities. The ratio of 1:3:8 between engineers, technicians and artisans should guide the establishment of technical and vocational institutions.

5. THE WAY FORWARD

We should realise that despite increased spending and numerous reforms our education system is not performing well. Large numbers of our children, especially from poor rural backgrounds, do not acquire even the most basic skills to enable them to find a decent employment. Although our work places, shops, and hospitals have changed greatly over the last decades, schools in Tanzania have remained as they were at the time of independence. The content, teaching approaches, and classroom resources and activities have remained unchanged. We should have realised by now that merely spending more money and hiring more teachers is not working. The problem of quality education has less to do with the inputs and more to do with the curriculum and interaction between teachers and students. The key to transforming education and improving learning is to change what is happening in classrooms. Our focus should be on what children learn in class and how they learn it. Our focus should be more on the outcomes of the education system and less on inputs. This is not to say that inputs like textbooks, desks, etc. are not important; of course they are, but far more important is what our children learn at the end of the day in school.

Arguably the most difficult problem facing Tanzania in the education system is to find ways to break out of the downward-spiralling system of classroom teaching. Poor teaching produces poor students who become poor teachers, perpetuating the free fall. It is unrealistic to recommend that only those students who achieve Division 1 or 2 be allowed to become teachers, as the status of teachers has deteriorated so much that it is unlikely that well-performing students will go into the profession. However, there are things that can and must be done.

Teachers and Teaching

The World Bank (2013) study on the Service Delivery Index brings out couple of disturbing facts. First, many of our teachers are not in school when they should be and are not in class when they are in school. For learning to take place, both children and teachers should be in school. Analysis of the PISA results (OECD, 2014) shows that one contributing factor towards poor performance in school is attendance. How much time students spend in classroom is key to the quality of education. If Tanzanian students spend 200 days in classrooms, this means that in a given year they are spending 3,600,000 seconds in class. At the end of the year these children should have learnt an amount commensurate to the time they spent in class. The government, the community and parents should hold teachers accountable for the amount of time the children have spent in school.

For teachers and schools to be effective requires effective leadership at the school level. At the moment head teachers are not effective, as they have little power over teachers. This needs to change: head teachers need to be empowered and made accountable.

The second problem that the study (World Bank, 2013) found was that many teachers lack content knowledge of the subject they teach. If the teachers do not know their English or

their Swahili, then they certainly will not be able to teach the students. Studies (Sumra, 2005; Mkumbo, 2012) have shown that students who do well on the CSEE and ACSEE are unwilling to become teachers. This partly explains teachers' poor content knowledge. Many of those who join the teaching profession do so reluctantly. These teachers have low motivation and do not want to develop their careers in the profession. There is a need to focus on getting the right people to become teachers. The lost status of teachers needs to be regained if the right kind of people are going to be attracted to the profession.

Teaching and the way children are assessed need to be changed. Currently the focus of teaching and assessment is on answers. Questions need to be made central to teaching. Teaching should focus on developing the necessary skills such as reading, writing, numeracy, problem solving, critical thinking and so on.

Revisit the Curriculum

It is obvious that Tanzanian education needs revamping. Education needs to focus on developing literacy and numeracy skills among primary-school graduates. Development of higher skills and capabilities should be the focus of secondary and higher education. The education system has to ensure that children graduate from schools with employable skills – meeting the requirements that employers demand.

Our discussion shows that many young people are unemployable as they do not have the skills that employers require. A close look at Tanzanian unemployment statistics reveals a contradiction: even with high levels of unemployment, large numbers of jobs are going unfilled. Many of these jobs have one thing in common – the need for an educational background in science, technology, engineering and mathematics. Increasingly, one of the richest sources of employment and economic growth will be jobs that require skills in these areas, collectively known as STEM. The question is, will the country be able to educate enough young Tanzanians to fill them? The hardest jobs to fill are skilled positions, including well-compensated blue-collar jobs like machinists, operators and technicians, as well as engineering technologists and scientists. We can safely conclude that too many students and adults are training for jobs in which labour surpluses exist and demand is low, while high-demand jobs, particularly those in STEM fields, go unfilled.

Despite the lucrative potential, many young people are reluctant to enter fields that require a background in science, technology, engineering or mathematics. Data on university enrolment for the year 2011/12 show that more than 80,000 students were enrolled in the humanities, social sciences, business and law compared to only 8581 students in science, and 6030 in engineering (URT, 2012c: p. 159).

One possible solution is to introduce STEM education before the primary level. STEM education is a curriculum based on the idea of educating students in four specific disciplines — science, technology, engineering and mathematics — through an interdisciplinary and applied approach. Rather than teach the four disciplines as separate and discrete subjects, STEM integrates them into a cohesive learning paradigm based on real-world applications. One of the problems with the current curriculum is that there is a disconnect between what children learn in classroom and what happens in their daily life. STEM is a way to connect learning with the life experiences of the children. What separates STEM from traditional

science and math education is the blended learning environment, which shows students how the scientific method can be applied to everyday life. It teaches students computational thinking and focuses on real-world applications of problem solving.

We must make core subjects like math and science relevant for students, and at the same time, foster creativity, curiosity and a passion for problem solving. That is what STEM education does. STEM is about using math and science to solve real-world challenges and problems. This applied, project-based way of teaching and learning allows students to understand and appreciate the relevance of their work to their own lives and the world around them. Once they grasp core concepts, students are able to choose a problem and use their own creativity and curiosity to research, design, test and improve a viable solution.

STEM is more than just a grouping of subject areas. It is a movement to develop the deep mathematical and scientific underpinnings students need to be competitive in the twenty-first-century workforce. However, this movement goes far beyond preparing students for specific jobs. STEM develops a set of thinking, reasoning, team work, investigative and creative skills that students can use in all areas of their lives. STEM is not a standalone class – it is a way to intentionally incorporate different subjects across an existing curriculum.

Focus on Skills Development

Education should focus on basic skills and other skills that will be required in the place of work. Literacy and numeracy are foundation skills on which the edifice of further education is built. One measure of the health of the school system is that by age of 10, children should have acquired basic literacy and numeracy skills. ICT skill is another skill that has become important in recent years. Our children should also be taught financial literacy. Financial skills are crucial to school graduates who go from the world of school to the world of work. Students should be taught about banking, interest, savings, withdrawals and different types of accounts. Students should also be taught about how to manage their finances by proper budgeting and saving.

Education in any country is tasked with preparing the next generation to succeed in life. That is a tall order and it will substantially fail if it does not teach children how to think critically and solve problems. Education needs to be driven by dynamic innovation to bring it out of the colonial age. Behavioural skills such as punctuality, honesty, working as a team and respecting different views need to be developed in schools.

Strengthen Technical Education

The Korean and Singapore examples have shown that meeting industrial demand for skilled workers requires first-class technical and vocational institutions. In order to improve the functioning of technical colleges, the government should commit to improving provision, enhancing the responsiveness of programmes to labour-market needs and funding technical colleges adequately to support these initiatives. In addition, there is need to continue and accelerate efforts to build capacity in technical colleges, through among other things improving governance and management, expanding and improving the quality of the offerings, strengthening the curriculum, etc. Colleges need to be responsive to changes in the country's economic environment and produce skilled workers for emerging

industries such as gas and oil, communication, fashion and entertainment. For colleges to be responsive to emerging needs, they will require a level of autonomy with respect to the kind of courses they provide and staff they hire. There is need to build close links between the colleges and businesses. One possible way this can be achieved is for a large company to 'adopt' a college. Another way in which close collaboration can be built is by experts working in companies to act as visiting lecturers. These lecturers will bring into class their work experience, which will connect the colleges with the world of work. Every student in technical colleges should be provided with access to industries to give them workplace exposure.

Make Vocational Education Relevant to Work Needs

To make the existing vocational education system relevant to market needs, a major restructuring of the system and how it is managed will be needed. This will require among other things improving governance and management, expanding and improving the quality of offerings, and strengthening the curriculum. If Tanzania wants to emulate countries like Korea and Singapore, where the vocational education system has succeeded, sweeping reforms are needed. This will require significant commitment on the part of policymakers. This can be achieved through:

- *Ensuring private-sector participation in management of institutions and curriculum design* to ensure a direct connection to the labour market for graduates, and an effective medium for bringing about organisational and productive innovations.

- *Ensuring that vocational education is not a dead end* – allowing well-performing students in the vocational education track to proceed to higher education will ensure that the vocational stream is not seen as an option of last resort by prospective students. For this majority group, access to secondary education and VET is crucial and for most of them secondary education and VET will be the last stage of their formal schooling. An effective school-to-work transition for these young people, made possible by higher-quality secondary and tertiary education and VET, will improve their employment prospects and lifetime earnings.

Increase Apprenticeship Training Programmes

There is need for formalising apprenticeship training. Addressing the issue of employability first requires improved workforce planning. Employers and the higher-education sector should plan five to six years ahead to understand the future skills mix required so that supply can be adjusted. While forecasting by its nature carries risk, without forecasting the higher education sector and students are simply guessing what graduate jobs will be in demand by the time they graduate. Apprenticeship training removes many of the uncertainties that result from future forecasting.

Therefore government shall ensure that:

a) Every large enterprise shall adopt a wider apprenticeship modular training scheme as a means of providing opportunities for much larger proportions of the labour force to benefit from certified training activities;

b) Traditional apprenticeship training on employment promotion is implemented through the establishment of programmes like distance training, advisory services, mobile training workshops and availing incentives for trainers or master craftsmen; and

c) A mechanism is established to facilitate employers so that they recruit more technical trainees in their industries.

Invest in R&D

In developing countries, innovation is a key outcome of the commercialisation of university research, often jointly done with industry. The transaction is clear – industry has a problem to be solved and the money, while the university provides the research to find the solution. Tanzanian universities must become more enterprising and entrepreneurial in their approach, look to create solutions for industry that add value through a new product or service line, and innovate and create value through collaboration. Higher education must take increased responsibility for developing an indigenous workforce that is entrepreneurial and creative, supported by increased technological capability. For this to happen universities need to be supported both by the government and development partners to ensure that they have resources and personnel to carry out R&D activities. For our R&D to succeed collaboration between the government, industries and institutions of higher learning is required.

Strong and Committed Leadership from the Government

Finally, the government has to be accountable for the running of all the educational institutions in the country. It needs to ensure that quality education is delivered by all schools and colleges. The government has to ensure that parents and the nation are getting value for their money when they send their children to these institutions. Korea and Singapore have shown that it is possible for a poor country to develop and achieve higher standards of living for its population. Like Singapore and Korea, Tanzania needs to put in place strong quality assurance and quality control.

Revisit Social Policy in Education

The examples of Korea and Singapore show that both countries built an egalitarian, quality primary education on which to build higher levels of education. Tanzania has to assure that all children receive quality education. Inequalities that have creeped in education through privatisation need to be re-evaluated. Schools too can make efforts by focusing on poorly performing and marginalised children. Special measures need to be taken by the government by target low performance, regardless of students' socioeconomic status, either by targeting low-performing schools or low-performing students within schools, depending on the extent to which low performance is concentrated by school. Measures need to be taken to ensure that low-performing students or schools are assisted. Disadvantaged children should be assisted through additional instructional resources or economic assistance. These programmes select students based on their families' socioeconomic status, rather than on the students' cognitive abilities. While policies targeting disadvantaged children can aim to improve these students' performance in school, they can also provide additional economic resources to these students.

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The Economic and Social Research Foundation (ESRF)
51Uporoto Street (Off Ali Hassan Mwinyi Road),
Ursino Estate • P.O. Box 31226, Dar es Salaam, Tanzania.
Tel: (+255) 22 2760260, 2760751/52,
Mobile: (+255) 754 280133 • Fax: (+255) 22 2760062,
Email: esrf@esrf.or.tz

Supported by:
United Nations Development Programme (UNDP)
6th Floor, International House
Shaaban Robert St./Garden Avenue
Dar es Salaam, Tanzania
Tel: (+255) 22 2112576 • Mobile: (+255) 786 965555