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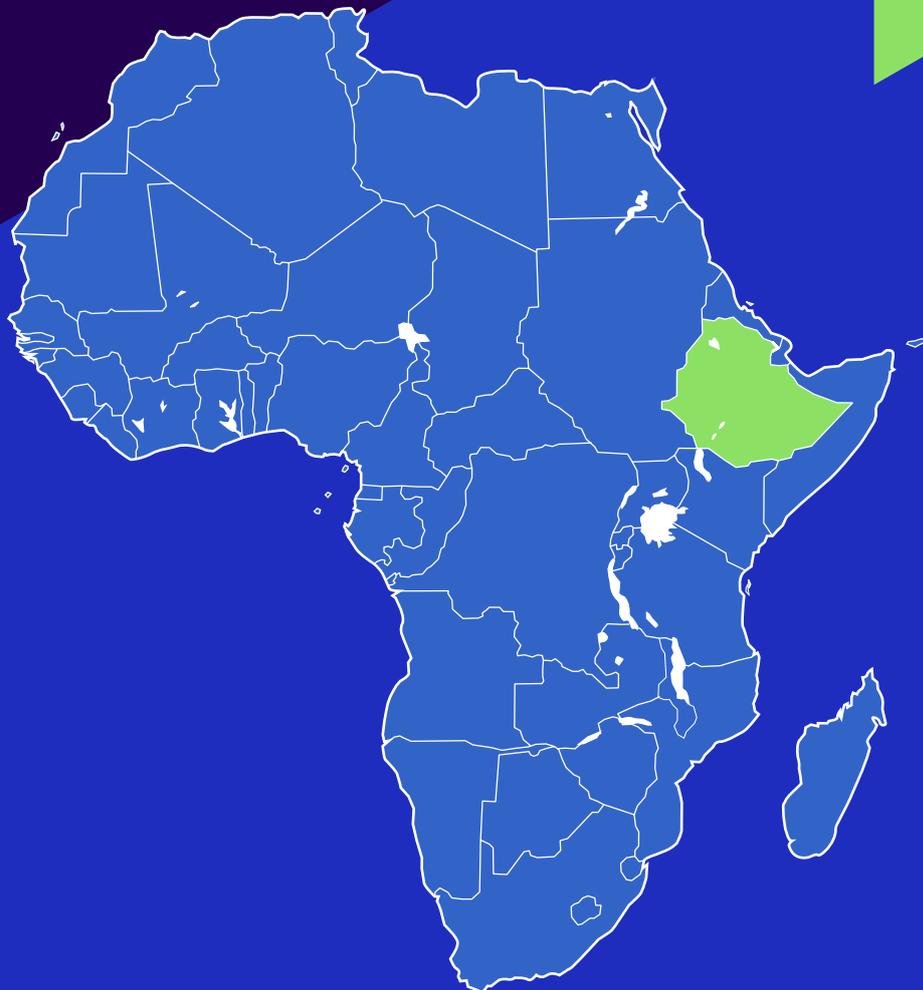
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für Internationale
Zusammenarbeit (GIZ) GmbH

Background report

▶ Digitalization in teaching and education in Ethiopia

*Digitalization, the future of work
and the teaching profession project*

Moges Yigezu



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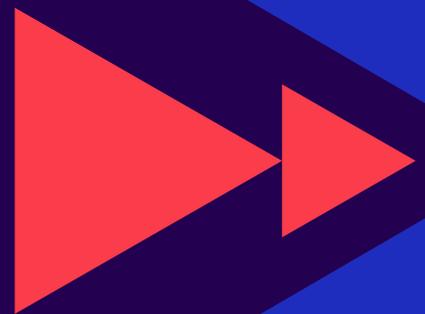
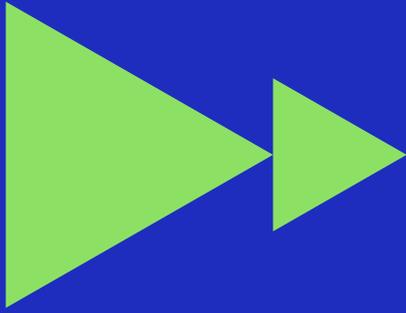
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▶ Abbreviations

▶ BMZ	German Federal Ministry for Economic Cooperation and Development (Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung)
▶ CPD	continuous professional development
▶ EMIS	Education Management Information System
▶ ESDP	Education Sector Development Programme
▶ ETA	Ethiopian Teachers' Association
▶ EthERNet	Ethiopian Education and Research Network
▶ eWTP	Electronic World Trade Platform
▶ GEQIP	General Education Quality Improvement Programme
▶ GEQIP-E	General Education Quality Improvement Programme for Equity
▶ GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
▶ GTP	Growth and Transformation Plan
▶ ICT	information and communication technology
▶ ILO	International Labour Organization
▶ NGO	non-governmental organization
▶ SMIS	School Management Information System
▶ STEP	Sustainable Training and Education Programme
▶ TMIS	Teacher Management Information System
▶ TPACK	technological, pedagogical and content knowledge
▶ TVET	technical and vocational education and training
▶ USAID	United States Agency for International Development



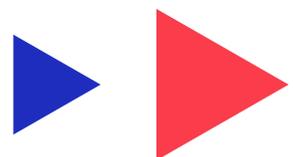
▶ 1. Key findings

The aim of the research presented in this study was to explore the current practices, challenges and prospects related to the use and integration of digital technology in education in Ethiopia, and how digital technology is impacting the teaching–learning process in terms of preparing students for a knowledge-based economy.

The findings show that the use of digital technology in Ethiopian schools is at an early stage, mainly due to limited infrastructure development in information and communication technology (ICT) and a lack of trained human resources. Ethiopia stood 151st in the United Nations E-Government Development Index (2018) out of 193 countries, indicating that the country has been supported by minimal technological advancement. Nevertheless, Ethiopia has made ambitious attempts to network its education system with ICT. Two large ICT projects have been implemented in this regard: the SchoolNet initiative, which aims to develop a wide-area network linking schools in the country by making internet and online education accessible, and the General Education Quality Improvement Programme II (GEQIP II), which is an ICT intervention aimed at improving the learning environment in schools (Government of Ethiopia 2013). An enabling environment has also been created through an updated National ICT Policy and Strategy (Government of Ethiopia 2016).

The integration of digital technology in education in Ethiopia has its own challenges. Digitalization is a costly process that also requires competent human resources, and its implementation is affected by several factors. The prime barrier has been the limited knowledge and capacity of teachers and students in the use of digital technology. While most teachers and students are skilled in word processing, the use of digital content in the actual teaching and learning of subject areas has not been fully developed.

Critical gaps in the use of digital technology include: (a) building the capacity of in-service teachers in digital and pedagogical skills through continuous professional development (CPD); (b) reforming teacher education and training to augment the use of digital technology; (c) promoting social dialogue through the involvement of teachers in programme and policy design; and (d) securing funding to undertake these initiatives.



► 2. Introduction

Until the twentieth century, the three primary means of instruction had almost exclusively been the teacher, the textbook and the chalkboard. For most of the twentieth century, this remained largely the case, with print media being the predominant technology in education. In today's digital world, however, education systems are under increasing pressure to use digital technology to teach students the knowledge and skills appropriate for a knowledge-based economy. This has, in turn, prompted a rethinking of the way education is delivered, the role of the teacher and students and the overall purpose of education in order to prepare children and youth for the changing world of work through effective lifelong learning and quality education.

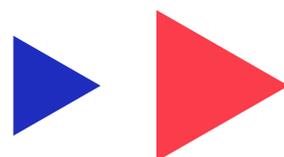
As in many developing countries, Ethiopia has embraced the use of ICT in education and has recognized ICT as an enabler for widening access to education, supporting literacy education and facilitating educational delivery and training at all levels, as stipulated in the 2016 National ICT Policy and Strategy (Government of Ethiopia 2016). The strategy envisages the integration of ICT into the learning, teaching and administration of school systems through the establishment of ICT networks in schools. Despite its economic constraints and limited infrastructure facilities, Ethiopia has made rapid investments in technology-based learning.

The current research, as initiated by the International Labour Organization (ILO) and GIZ/BMZ,¹ is part of a larger project focusing on five Eastern African countries, including Ethiopia. The aim of this research was to explore: (a) how teaching–learning processes are adapting to the new paradigm of education in light of the future of work; and (b) how new digital technologies are impacting the way learners learn and how teachers exercise their profession in the Ethiopian context.

¹ Deutsche Gesellschaft für Internationale Zusammenarbeit and German Federal Ministry for Economic Cooperation and Development (Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung).

▶ 3. Methodology

The study draws on existing policy documents and manuals from the Federal Ministry of Education, the Ministry of Science and Higher Education, and associated institutions such as the colleges of teacher education and the Federal Technical and Vocational Education and Training Agency. A desk review of selected research papers related to the use of ICT in education was also carried out. Media reports, materials and manuals produced by the government, international agencies and development organizations were included in the review. In order to obtain more detailed information on the use of digital technology in education, qualitative data were also collected through interviews from ten key informants at the Federal Ministry of Education, the Ministry of Science and Higher Education, the colleges of teacher education, the Ethiopian Teachers' Association (ETA) and non-governmental organizations such as GIZ.



► 4. Brief overview of the education sector

General education in Ethiopia² consists of eight years of primary education divided into two cycles: grades 1–4 and grades 5–8. Secondary education is also divided into two cycles: lower secondary (grades 9–10) and upper secondary (grades 11–12). Upper secondary is the preparatory programme for tertiary education. Technical and vocational education and training (TVET) is institutionally separate from the general education system, forming a parallel track, with training offered at the exit points of the general education system (grades 4, 8 and 10).

Due to massive transformations in and expansion of education over the past two decades, the number of students has increased enormously. The country has a total student population (primary, secondary and TVET) of 25 million (Government of Ethiopia 2019). This expansion has demanded large-scale recruitment and training of teachers. As of 2020, there are 36 colleges of teacher education, training primary school teachers through a three-year diploma programme. Since the 2010/11 academic year, selected higher education institutions, such as the Bahir Dar, Dilla, Jimma and Haramaya universities, have been training secondary school teachers. In addition, Kotebe Metropolitan University, a former teacher training college, trains teachers for both primary and secondary schools at diploma, Bachelor of Arts and Master’s levels.

In 2018/19, the total number of primary schools across the country was 37,039, of which 93 per cent were government owned. There was an increase of 573 primary schools in the public sector from the 2017/18 academic year, which was an additional factor contributing to the shortage of teachers. Exceptionally in Addis Ababa, the capital of Ethiopia, the number of non-government primary schools is higher than government schools. There were 3,739 secondary schools in the 2018/19 academic year, of which 89.6 per cent were government owned. In large cities such as Addis Ababa, Dire Dawa and Harar, there are more non-government secondary schools than government owned schools. According to the Federal TVET Agency, there are 1,568 TVET institutions and colleges throughout the country: 838 private, 673 public and 57 belonging to non-governmental organizations (NGOs).³

The landmark policy upon which the education system has been operating is the Education and Training Policy, issued in 1994. This was followed by associated successive programmes of action known as the Education Sector Development Programmes (ESDPs) I–V, implemented between 1996 and 2020 (Government of Ethiopia 1997, 2002, 2005, 2010a, 2015a). During those years, significant progress was registered in all areas of education, including decentralizing education administration and teacher development policy, addressing issues of diversity and inclusion, setting a higher level of training for teachers, introducing and implementing a career structure, introducing relative improvements to the salary scale and adopting a system of licensing and relicensing (Government of Ethiopia 2018a, 37). Nonetheless, the education system is experiencing major challenges in the areas of quality education and policy formulation and implementation. As a follow-up to the previous five ESDPs, ESDP VI was launched in August 2020 as a plan of action for the next five years (2020/21–2024/25) (Government of Ethiopia 2020a).

4.1 Teacher data

4.1.1 Number of teachers and projected required teachers

The teaching workforce is the largest workforce in the country, as compared to other sectors. In 2019, Ethiopia had a total of 711,863 teachers (430,813 male and 281,050 female) across all levels of education:

² Ethiopia does not have legislation that makes primary or secondary education compulsory, but an official document released in August 2020 – the Education Sector Ten-Year Strategic Plan (2020–2030) – stipulates that free and compulsory primary education shall be implemented.

³ The large presence of private schools in bigger cities is often attributed to the perception that private institutions provide education of better quality. Furthermore, internet infrastructure is more developed. For example, secondary schools in Addis Ababa were the most connected to the internet (76 per cent) during the 2018/19 academic year, followed by Harar and Dire Dawa, while the national coverage was only 21.5 per cent of total secondary schools (Government of Ethiopia 2019).

kindergarten, “O” class,⁴ primary, secondary and TVET. Of these, 42,225 teachers were deployed in kindergarten, 27,228 in “O” class, 502,738 in primary schools, 116,345 in secondary schools and 23,327 in the TVET sector.^{5,6} The majority of teachers at primary and secondary schools were male, accounting for 63.4 per cent of the total; however, in kindergarten and “O” class, the majority of teachers were female, constituting 79.5 per cent of the total (Government of Ethiopia 2019). In the TVET institutions, only 20.4 per cent of teachers were female.

The total number of teachers has increased by 8.7 per cent from the 2017/18 academic year (Government of Ethiopia 2019). The projected required number of teachers for general education is not available. For TVET, however, the second Growth and Transformation Plan (GTP II), 2015, projected the required number of teachers to reach 73,793 in 2020 (Government of Ethiopia 2015b).

The vast majority of teachers in Ethiopia are employed by the public sector, since private schools have only emerged during the last three decades. Pre-primary, primary and secondary school teachers in the public sector account for 87 per cent of the total population of the teaching workforce. At the national level, 92 per cent of school teachers in pre-primary and primary education are in public schools, with only 8 per cent in private schools. In terms of secondary school teachers, 90.4 per cent are in public schools and the rest are in private schools (Government of Ethiopia 2019).

4.1.2 Teachers in rural and urban areas

According to the *Basic Education Sector Analysis Report* (JICA 2012), between 2007 and 2012, rural enrolments accounted for the majority of enrolments (about 76–81 per cent), with urban enrolments accounting for one fourth or one fifth of total enrolments (about 24–29 per cent). In general, in secondary education the trend was the reverse, with urban enrolments accounting for the majority (about 85–92 per cent) and rural enrolments accounting for only 8–15 per cent. Over the past two decades, secondary school enrolment, which had previously been found to be disproportionately in favour of urban areas, has expanded rapidly in rural areas (Government of Ethiopia 2018b). As in most sub-Saharan countries, rural settings are poorly equipped in terms of infrastructure, transport facilities, water services, health facilities and housing. As a result, educational facilities in rural areas are largely poorly equipped with resources such as desks, books and even teachers, which often results in high teaching workloads. Such a reality has made teacher motivation and retention in rural areas a challenge.

4.1.3 Teacher attrition

The national attrition rate for public primary school teachers in 2018/19 was 2.2 per cent, with male teachers registering higher attrition rates at the national level at 2.4 per cent. Similarly, the attrition rate in public secondary schools was about 3 per cent nationally, which was almost equal for both female and male teachers – 3 per cent and 2.9 per cent, respectively (Government of Ethiopia 2019). The main reason cited for attrition among secondary school teachers was “leaving the teaching profession”, which accounted for 65.9 per cent, followed by “retirement”, with 14.6 per cent at the national level. The root cause of teacher attrition has been found to be lack of interest in the teaching profession due to a poor salary scale, lack of social recognition, unattractive working conditions and absence of opportunity for advancement (Government of Ethiopia 2018a, 41). Difficulties related to obtaining transfer (especially from hardship areas), shortage of school facilities and budget limitations for short-term training have also been identified as key factors for teacher attrition in Ethiopia (Government of Ethiopia 2018a).

4 “O” class is a one-year programme provided at the preschool level as an entry-level class in government primary schools for children aged six years. Formal schooling begins at age seven.

5 This number of TVET teachers (23,327) only accounts for government owned TVET institutions. The figure does not include the number of teachers in private and NGO owned TVET institutions, which constitute 57 per cent of the total.

6 TVET institutions in Ethiopia are separate from the secondary level of education. A recent policy, the Education Sector Ten-Year Strategic Plan (2020–2030), states that in grades 11 and 12, as of the 2021/22 academic year, in addition to the six academic subjects already being provided as part of the secondary preparatory class, an additional four vocational subjects will be introduced with the aim of preparing students with the skills and vocational training required to join the workforce upon completion of grade 12 (Government of Ethiopia 2020b).

4.1.4 Absenteeism

Teacher absenteeism remains a major issue in schools throughout the country, with the foremost causes being administration issues on the part of school management, job dissatisfaction, low payment rate, poor working conditions and low social status for the teaching profession (Berhanu 2013).

4.1.5 Collective representation

The Ethiopian Teachers' Association (ETA) is not registered as a teachers' union but as a professional association. According to the Ethiopian Civil Code, teachers must be organized under the category of "professional association" and not under labour law as a union. The implication of this law is that the ETA cannot call a general strike at any level. Currently, the ETA has around 600,000 members representing all subsectors of the education system from kindergarten to university. The ETA is predominantly present in public institutions; although teachers from private institutions are eligible for membership, there are few that are members. According to the leadership of the ETA, there is reluctance on the part of teachers in private institutions to become members due to the fact that teachers in private schools are not beneficiaries of government benefits such as housing, loans and access to a free plot of land. Furthermore, teachers in private schools are better paid than those in public schools, with salaries and benefits determined through personal negotiation. Moreover, some teachers in private schools stay in the profession temporarily, as a transition to other professions such as banking, marketing and insurance, making them less likely to pursue union membership.

Moreover, there has been an ongoing conflict between the ETA and the government on issues related to freedom of association.⁷ According to its president, the ETA has engaged with the government on a wide range of issues, including negotiating for improvement in teachers' working conditions. The ETA has also been working on the job evaluation and grading process for teachers in collaboration with the Ministry of Education, and participating in policy-related issues such as in the development of the Ethiopian Education Development Roadmap (2018-2030). As a major stakeholder in the education sector, the ETA has also been participating in high-level meetings organized by the Ministry of Education on monitoring and performance evaluation of the education sector.

One of the main demands of the ETA to the government has been that the Ethiopian Civil Code be revised to allow recognition of the ETA as a union. Another principal demand has been that a teacher service commission be established, as recommended by the Ethiopian Education Development Roadmap. In order to improve the living conditions of teachers in the country, the ETA has been negotiating on salary improvements and housing provisions for teachers on behalf of its members. As of 2020, over 50,000 teachers have been provided with condominium houses or a plot of land for free.

4.2 Teacher training and professional development

Teacher education at all levels of general education, except for TVET, can be divided into three stages:

- (a) initial teacher education, which has a duration of three years once a candidate has been admitted to a college of teacher education after the completion of the first cycle of secondary education (grade 10);
- (b) induction (the process of providing training and support during the first few years of teaching, or the first year in some schools);
- (c) teacher development or CPD (an in-service process for practicing teachers).

The required qualification for primary school teachers is a college diploma from a college of teacher education, with 92.4 per cent of the teachers being qualified for the level. The qualification required for secondary school teachers is a first degree or above. In 2019, the total number of teachers teaching in the secondary second cycle (with qualification reported) was 28,070. Of those, only 4 per cent fulfilled the standard or

⁷ See comments of the supervisory bodies of the ILO in relation to Ethiopia and the Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87) and the Right to Organise and Collective Bargaining Convention, 1949 (No. 98), available in [NORMLEX](#).

had a Master's degree in teaching (Government of Ethiopia 2019). Teacher licensing and relicensing⁸ are considered to be carried out, in many cases, in an unregulated manner, and there have been concerns that the system of licensing and relicensing could be “a very cumbersome, expensive and time consuming” enterprise with the potential danger of sliding into systemic corruption (Government of Ethiopia 2018a, 41). The Higher Diploma Program is the only institutionalized form of professional development for teacher educators, but it lacks a framework or direction as to what should follow completion of the Higher Diploma Program (Government of Ethiopia 2018a).

The qualification for TVET teachers is a Master's degree, and teacher licensing is a requirement. TVET teachers are classified as A, B or C, and all levels must have the requisite qualification and must be licensed by the Federal TVET Agency. A-level trainers must be qualified at the Master's level and B-level teachers must have a first degree. C-level teachers are those who graduated from TVET and polytechnic colleges.

CPD is generally accessible to all teachers and is financed by the government and donor organizations. The programmes on teacher preparation and professional development generally demonstrate a limited use of digital technology due to a lack of adequate access to ICT infrastructure, absence of a comprehensive teacher preparation and development policy, and lack of a clear governance and accountability system (Government of Ethiopia 2018a, 42–45). Neither student teachers nor teacher trainers are receiving adequate training in the use of ICT. The training of TVET teachers in the use of digital technology in teaching-learning activities has experienced similar challenges.

4.3 Financing

Relative to the overall budget allocation to various sectors, education has been a well-financed sector in Ethiopia. The provision of general education is the concurrent responsibility of federal, regional and woreda governments. The term “woreda” refers to a district, which is the lowest level of government structure in Ethiopia. The federal government plays a dominant role in setting standards and providing overall policy guidance and monitoring and evaluation. The regional government administers colleges of teacher education and secondary education, whereas the woreda administration is in charge of primary education.

In the financing of public education, the proportion of federal government funding is almost 50 per cent, whereas the share of the regional governments is approximately 25 per cent and that of the woreda governments is about 25 per cent. The trend of expenditure by subsector for the period of ESDP IV (2010/11–2014/15) showed that higher education accounted for the highest share (42 per cent), followed by primary education (32 per cent), secondary education (10 per cent), TVET (6 per cent) and other (10 per cent). Within the recurrent expenditures, salaries for teachers (including other staff) within the education sector accounted for more than 90 per cent in primary education, 80 per cent in secondary education, 60 per cent in TVET and less than 40 per cent in higher education (Government of Ethiopia 2015a).

Private education, on the other hand, is financed mainly through student fees. Financial support is not provided by the government. Following the Education and Training Policy of 1994, which opened the way for private schools, the government provided land as an incentive for the development of private schools. However, the practice did not continue and private educational institutions now have to compete in leasing land. The education sector budget is supported by funding from international partners, NGOs and community contributions.

4.4 Terms and conditions of employment

Teachers' salaries are generally low in Ethiopia compared to neighbouring countries in the sub-region. One of the consequences of low wages is that teachers may be absent due to secondary employment taken on to supplement their salaries (UNESCO-IICBA 2020). The teaching workload in government schools is quite high,

⁸ The Directorate of Licensing and Relicensing at the Federal Ministry of Education is the authority for certification of teachers in general education. For TVET, the authority is the Federal TVET Agency.

not only with instructional activities but also with non-instructional activities. Teachers are often expected to perform an increasing number of tasks for which they lack adequate time and resources.

The pupil–teacher ratio in the 2018/19 academic year was 50 at the primary level, 40 at the secondary level and 27 for TVET (Government of Ethiopia 2019, 29). The national pupil–section ratio⁹ was 53 for grades 1–8 in the 2018/19 academic year (Government of Ethiopia 2019). Compared to government schools, non-government schools have relatively better working conditions such as smaller class sizes, effective school management and support and, to some extent, greater availability of resources and higher wages (Teshome 2017). There is the perception that in non-government schools, teachers are more directly accountable to their “clients” (children and parents) and their managers (head teachers) and are less likely to be absent. They are more compliant with employer expectations in relation to the use of instructional programmes, materials and practices (UNESCO-IICBA 2020). The shortage of competent and motivated trainers and instructors in the TVET sector has been attributed to the fact that the current salary scale, incentives and reward systems are not sufficiently attractive to recruit and retain skilled and experienced trainers from industry (Government of Ethiopia 2018a, 76).

In terms of social protection, pensions are provided to all civil servants, including teachers. Teachers also have access to housing provisions. In Addis Ababa, for instance, teachers are given priority in the provision of condominium houses through the designated allocation of available houses. In some regions, such as Oromia, the Southern Nations, Nationalities and People’s Region, and Amhara Regional States, teachers are provided with land for free and access to credit services to build their own houses (interview with ETA leadership).

4.5 Existing policy frameworks

Following the Education and Training Policy of 1994, a series of successive five-year strategic programmes, ESDP I–V, were designed and implemented. The country is currently towards the end of the implementation of ESDP V, which covers the period 2015/16–2019/20. ESDP V is aligned with GTP II, which covers the same period. GTP II, which has the central objective of addressing the human development needs of the country, has recognized the special role that the education sector has in transforming the economy by supplying the required skilled human resources and technological innovations. Acknowledging the fact that Ethiopia needs to transition to a knowledge economy, the government formulated and implemented two subsequent ICT policies, in 2009 and 2016, and provided institutional support for their implementation. The latest updated Ethiopian ICT Policy and Strategy (Government of Ethiopia 2016) takes education as one of its strategic pillars for transforming the Ethiopian economy, including through the use of ICT. According to the policy document, ICT can enhance the education system by facilitating access to a wealth of information and online coursework and by developing digital skills in schools, thereby enhancing access to and quality of education, in support of the development of human capital.

The latest reform initiative put in place in this regard is the Ethiopian Education Development Roadmap for 2018–2030. The document contains several proposed reforms and suggested paradigm shifts in the education system. The Roadmap mentions ICT as one of the cross-cutting areas that is generally overlooked in the education sector. In relation to the use of ICT in teacher preparation and development, the Roadmap underscores that pre-service teachers should be trained not only on how to use a computer, but also on how to design high-quality, technology-enhanced lessons. It states that both student teachers and teacher educators should have access to ICT infrastructure (Government of Ethiopia 2018a, 47).

⁹ The pupil–teacher ratio refers to the total number of students assigned to a teacher in a classroom. The pupil–section ratio refers to the number of students in a section, in a situation where a certain grade level has more than one section. The pupil–teacher ratio is often used to measure efficiency and quality in the education system.

► 5. Technology and teacher management

The responsibility for teacher management is divided into several levels due to the decentralization of education management to the lowest administrative unit (woreda). Decision-making powers are delegated to direct service providers, namely woreda education offices and individual schools. The selection and allocation of new graduate teachers is the responsibility of the regional government, while recruitment, placement and salary payments are the responsibility of woreda administration (UNESCO 2010). Promotions are examined by woreda education offices based on the teacher development policy upgrading system, years of working experience and performance.

Technology has come to play a central role in teacher management, particularly in facilitating the use of information for educational development and in producing the teaching workforce needed for the twenty-first century. One aspect of teacher management is the enhancement of teacher training through the use of ICT to promote progress in all aspects of content and pedagogy on a continuous basis. Teacher management also refers to aspects dealing with the teaching workforce, including policies, strategies and approaches that support teachers at all levels.

One area where technology can also make a vital contribution to teacher management is through the Education Management Information System (EMIS), a scheme designed to systematically organize information related to the management of educational development and to assess the performance and internal efficiency of the education system. The EMIS aims to collect, organize and report accurate, relevant and timely data through the use of digital technology for planning and decision-making purposes (UNESCO 2003). In Ethiopia, within the Ministry of Education, there is an EMIS-ICT Directorate, with the EMIS section regularly publishing an annual education abstract, which provides insight into the status of education and training on a yearly basis. During ESDP V (2015–2020), the EMIS was expanded to integrate the School Management Information System (SMIS) and the Teacher Management Information System (TMIS)¹⁰ for general education, but has not yet been developed to include TVET and higher education. The abstract further provides performance and statistical data measuring Ethiopia's progress against priorities set out in the ESDPs. Achievements in education are also compared to previous years against 47 indicators as well as other measures of educational performance.

The annual publication reports on all levels of general education, covering pre-primary, primary, secondary, integrated functional adult literacy, special needs and colleges of teacher education. It incorporates data from all nine regional states and two city administrations. EMIS offices are established in each woreda and data collection is done manually through a template provided by the EMIS-ICT Directorate of the Ministry of Education. School heads are trained on how to fill in the template in hard copy and send it back to the Ministry of Education. Challenges faced with this kind of data collection process include accuracy of data and delays in reporting.

The abstract has been the primary source for monitoring data for each subsector and has been a valuable source of data for various stakeholders, including education planners, policymakers and administrators, enabling them to make informed strategic decisions. It is a comprehensive source of national data on the education sector and may be the only official database available online. The abstract has included data on refugee education since the 2016/17 academic year, which will allow for better management and enhanced provision of education for refugees (Government of Ethiopia 2019).

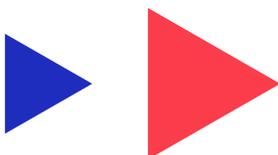
Teacher management is also linked to teaching–learning methods, leadership, rights of teachers, professional development, decision-making skills, choice of workplace, responsibilities and working environment. In addition, teacher management takes into account the structure for the appraisal of teachers and grievance handling procedures. In order to facilitate the professional and personal development of teachers and

¹⁰ Information on issues of educational performance have been organized via the EMIS through EMIS offices established in all woredas and published by way of an annual statistical abstract. During ESDP V two new functions were added, namely the SMIS and the TMIS. The SMIS has been designed to focus on school-level performance data related to activities implemented by school leaders, whereas the TMIS has been designed to collect more detailed information on teachers throughout their career and track the deployment of teachers in schools across the country.

enhance the quality of education, the use and integration of digital technology in teacher management must go beyond data collection and reporting (UNESCO 2003).

In Ethiopia, the use of ICT for teacher management requires further development, partly due to the low level of digital literacy of teachers, school principals and educational officials (Gebremariam 2004; Hussein 2018). Digital literacy involves much more than the ability to handle computers; it comprises a set of basic skills that include “the use and production of digital media, information processing and retrieval, participation in social networks for creating and sharing knowledge and a wide range of professional computing skills” (Gizealew and Sisay 2019, 6). According to UNESCO (2018, 6), digital literacy is defined as “the ability to access, manage, understand, integrate, communicate, evaluate and create information safely and appropriately through digital technologies”. Hence, digital literacy “includes competencies that are variously referred to as computer literacy, ICT literacy, information literacy and media literacy” (UNESCO 2018).

Studies conducted on the use of digital technology in schools in Ethiopia have pointed out several technical and administrative obstacles, such as the poor perception of ICT among school principals and educational officials and lack of appropriate ICT policies in schools, resulting in a lack of commitment on the part of school leadership (Gebremariam 2004; Kim and Gebeyehu 2014; Hussein 2018). Moreover, the managerial capacity of educational authorities at all levels is, in some cases, compromised and constrained due to many leaders and managers of educational institutions being political appointees (Government of Ethiopia 2018a, 92), resulting in school leadership that lacks know-how of the use of digital technology in schools. In order to engage school administration in the use of digital technology, ICT training for principals has been proposed, the argument being that innovation cannot be accomplished without the full engagement and support of educational administrators (Kim and Gebeyehu 2014, 85). Adapting technologies appropriate to the context of implementation, and with clear purpose and content, is also necessary (GIZ 2016, 8).



► 6. Digital skills training and development for teachers

The Ethiopian Government acknowledges education and training as the cornerstone of social progress and economic development. Digital technology facilitates the development of education and enables both individuals and countries to meet the challenges presented by the knowledge and information age. As the vast majority of the Ethiopian population lives in rural areas that lack quality education, digital technology can play a role in addressing issues of access to and quality of education. The government is committed to the use and application of digital technology for educational development, particularly in the training and development of teachers, and is working to “ensure that ICT is equally available across all levels of the school system” (Government of Ethiopia 2016). For this purpose, the National ICT Policy and Strategy (2016), an updated version of the previous policy (Government of Ethiopia 2006), identified the following strategies in relation to teacher preparation and development, among others: (a) revise the existing financing scheme so that cost is not a barrier for connecting educational institutions to the nationwide school network; (b) update school curricula to include ICT courses; (c) achieve a critical mass of trained ICT teachers by providing training to teachers; and (d) expand the ongoing electronic education programme to embrace all levels of education and training across the country.¹¹

In order to promote the development and application of digital technology in teacher preparation and development in recognition of its role for national development, over the past two decades, Ethiopia has embarked on several initiatives. The two major ongoing interventions to connect educational institutions across the country are the Ethiopian national SchoolNet initiative and the Ethiopian Education and Research Network (EthERNet). These ICT-related initiatives support the teaching–learning process by facilitating delivery of content (that is, remote teaching through the use of technology supported by a classroom teacher, who has the role of facilitating, guiding and monitoring), creating audio and video recorded modules for teaching and learning, and connecting learners and teachers virtually. Specifically, the national SchoolNet initiative, which was launched in 2004, focuses on the deployment and use of ICT to facilitate teaching and learning in secondary schools. It aims to develop a wide-area network linking all secondary schools in the country by making internet and online education accessible. The full implementation of the SchoolNet initiative encompasses teacher training, local language instruction, monitoring and assessment of students’ performance, education system management, and eventually providing students with the skills required for the changing world of work. It is the largest education initiative launched by the Ethiopian Government and constitutes a key component of its e-government programme. The EthERNet aims to develop a network for connecting public universities and educational institutions.

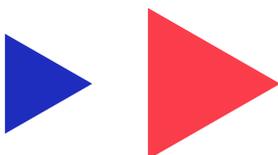
As a follow-up to the SchoolNet initiative, another project was launched in 2013 under the General Education Quality Improvement Programme II (GEQIP II), which is supported by the World Bank and the United States Agency for International Development (USAID). Its aim was to improve learning conditions in primary and secondary schools and strengthen institutions at different levels of educational administration. The project had six components: (a) curriculum textbooks and assessment; (b) teacher development programme; (c) school improvement programme; (d) capacity-building in management, including EMIS; (e) improving the quality of learning and teaching through the use of ICT; and (f) programme coordination, monitoring and evaluation. Through its ICT intervention, GEQIP II aims to improve learning conditions, the learning experience and learning outcomes for learners in selected secondary schools and universities. Specifically, GEQIP II has supported the provision of ICT infrastructure (computer-assisted learning facilities with appropriate and sufficient hardware and software) in 300 secondary schools and 10 universities, and the development of an e-learning system (Government of Ethiopia 2015a), which is a technology-mediated learning facility for instructional delivery.

¹¹ The electronic education programme entails utilizing electronic technologies to access educational curricula outside the traditional classroom. In most cases, it refers to a course or a programme delivered entirely online.

Key factors obstructing the implementation of these initiatives include inadequate capacity of existing infrastructure, limited access to the internet and ICT by teachers and lack of coordination among stakeholders (Gebremariam 2004; Temtim 2017; Hussein 2018; Gizealew and Sisay 2019). Other major challenges include low proficiency in the use of ICT, general lack of knowledge about technology in teaching and learning, inadequate training curriculum, poor-quality management and leadership and acute shortage of teachers trained to integrate technology into teaching and learning in their subject areas (Hare 2007; Berhanu 2016; Temechegn 2011). A recent study also indicated that most teachers and students are only proficient in word processing, but not in the use of ICT for teaching and learning in different subject areas (Hussein 2018).

In the training and development of teachers, particularly in colleges of teacher education, ICT is being used in two modes. First, ICT as a subject is taught to all student teachers as a common course, which aims to develop the basic computer skills of pre-service teachers. As such, the curriculum contains two courses to be provided by the ICT departments of the colleges of teacher education to all student teachers. They are not, however, trained in the use of ICT for pedagogical purposes, that is, for teaching and learning in different subject areas. Second, ICT is taught as a discipline through a three-year diploma programme within the college, with the overall aim of developing ICT teachers. Computers and other digital tools are available in colleges of teacher education, but are not sufficient in number. There is also a limited number of ICT teaching staff, from four to six ICT professionals per college.

Student teachers need to be equipped with the appropriate skills and knowledge in the use and potential of digital technology for teaching and learning. Teacher education institutions have to equip student teachers not only with the basic skills in the use of computers and other technologies, but also in technologically enhanced pedagogy (Temechegn 2011). The use of ICT for pedagogical purposes has generally been limited in Ethiopian schools and teacher training institutions. CPD programmes for in-service teachers are available and accessible in theory, but such training is provided on an ad hoc basis and mainly focuses on teaching methodologies without digital technological inputs. Interview participants consistently articulated that CPD training is not well organized and does not involve any elements of ICT. A recent review by the Ministry of Education on in-service CPD has confirmed these findings. The review questioned the quality and relevance of CPD programmes and emphasized the need to: (a) institutionalize CPD in both schools and colleges of teacher education; (b) reconceptualize CPD to include professional development opportunities that incorporate ICT and other emerging pedagogical trends; (c) develop relevant and quality materials and modules for CPD training; and (d) integrate CPD into teachers' career structure and relicensing (Government of Ethiopia 2018a, 45). Given the evolving nature of technology and thus labour market skills, responsive education systems must provide access to CPD opportunities for teachers that integrate digital technology.



► 7. Pedagogical uses of technology

Technology integration is achieved when the use of technology becomes routine, seamless and readily available for the intended task, and is supportive of curricular goals and student learning and achievement. Technological, pedagogical and content knowledge (TPACK) theory, as initially developed by Mishra and Koehler (2006), is a framework that outlines the knowledge that educators need in order to successfully integrate technology into their teaching. In order for teachers to make effective use of the TPACK framework, according to Kurt (2019), they need to be familiar with key principles, including that (a) concepts from course content being taught can be represented using technology; (b) pedagogical techniques can communicate content in different ways using technology; (c) students come into the classroom with different backgrounds, including exposure to technology; and (d) digital technology can be used in tandem with students' existing knowledge, helping them develop new skills. As Kurt (2019) underscores: "Teachers need not even be familiar with the entire TPACK framework as such in order to benefit from it: they simply need to understand that instructional practices are best shaped by content-driven, pedagogically-sound, and technologically-forward thinking knowledge."

In accordance with the TPACK framework, the Ethiopian Government initiated the Satellite Plasma TV Project in 2003 to improve the quality of secondary education by utilizing educational media in order to overcome: (a) the shortage of qualified teachers, especially in remote and inaccessible areas of the country; (b) the lack of good teaching models; and (c) the shortage of textbooks and inefficient distribution of teaching materials. Through the Satellite Plasma TV Project, pre-recorded course content is delivered by a remote teacher via the plasma screen, with the classroom teacher monitoring and explaining content. The plasma mode of instruction includes a blended approach, combining televised instruction (from the centre established by the Ministry of Education) with face-to-face instruction (the classroom teacher), with a 75 per cent and 25 per cent ratio respectively. The televised instruction covers 30 minutes of the total 40 minutes of classroom time, with the remaining ten minutes left for the classroom teacher – five minutes to introduce the lesson and five minutes to summarize (Berhanu 2016). The project also aims to standardize delivery of education material nationwide.

Various studies (Kim and Gebeyehu 2014; Berhanu 2016; Temtim 2017; Hussein 2018) have critically evaluated the implementation and impact of the Satellite Plasma TV Project, with the overall conclusion being that the project did not realize most of the benefits of e-learning due to its technocentric orientation. The challenges identified in implementing the project include: (a) lack of consultation with stakeholders (including students and teachers) before launching the project; (b) it being a politically motivated initiative that followed a top-down decision-making process; (c) the transmission of content delivery being too fast to follow; (d) lack of competence in the language of instruction (English) on the part of students and teachers, particularly the mismatch between the speed and accent of the plasma presenter and the students' language capability; (e) the transmission being a one-way delivery, resulting in lack of interaction in the classroom; and (f) absence of a monitoring and evaluation mechanism. The use of satellite plasma TVs requires teachers' combined knowledge of technology, subject matter and pedagogy, as advocated in the TPACK framework.

Some advantages of the Satellite Plasma TV Project included the following: (a) it presented content via a multimedia format, enabling students to understand abstract concepts, as it allows technical concepts to be explained through visual demonstration; and (b) students that utilized satellite plasma TVs registered improved performances compared to those that have not. The project was inactive at the time of publication of this report.

According to the Ministry of Education, as quoted by the Ethiopian News Agency (13 March 2018), "300 schools across the country are benefiting from digital technology introduced to promote quality education" through the GEQIP II project.¹² The initiative was initially piloted in two schools over a three-year period.

¹² Ministry of Education announcement at consultative meeting, 13 March 2018.

In March 2018, the Ministry of Education, in partnership with the World Bank, introduced digital technology into 300 schools across the country, whereby students use technological devices such as tablets with the overall aim of increasing efficiency in their educational activities.¹³ The lessons learned and experiences gained from the pilot study were not available at the time of publication of this report.

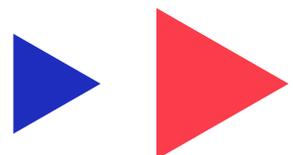
Private school teachers, including those in some TVET private institutions, are more likely to use digital technology in the teaching–learning process. Digital technology, such as phones and tablets, are being used for evaluating student learning and for accessing and sharing teaching materials online.

The use of digital technology in education can potentially overcome issues of cost, teacher shortages, poor-quality education and time and distance barriers, but using digital technology in educational settings on its own may not bring about all expected changes (Kim and Gebeyehu 2014, 85). The idea that ICT can help in overcoming teacher shortages has been entertained by several researchers (Berhanu 2016; Hussein 2018; Temtim 2017), with the general argument being that technology should act as a complement to teachers rather than a replacement. Temtim (2017, 1), for instance, argues that teachers are not replaceable and technology is not a panacea for all problems; the emphasis should rather be on enhancing human capability to use ICT as a tool to solve educational challenges. Technology as a tool should support and enable good teaching and quality learning (GIZ 2016, 35).

13 Ministry of Education announcement at consultative meeting, 13 March 2018.

▶ 8. Teaching ethical and critical use of digital technology

Teacher training institutions recognize the importance of offering ICT courses for teacher trainees; however, one area that has been overlooked in many courses is the ethical and critical use of digital technology. Teachers are expected to transfer this knowledge to their students, especially given concerns about copyright infringement, security and privacy violations and e-safety. Teachers, in their discussions with students about e-safety and fair use of ICT, must also address questions such as who owns digital data and how information is used, secured and protected (GIZ 2016, 27). In Ethiopia, however, pre- and in-service teachers do not receive adequate training in the ethical and critical use of digital technology.



► 9. Relevant regulatory or policy frameworks in relation to digitalization and education

9.1 Status of legislation

There is no fundamental law or act of education in Ethiopia, but introducing an Education Act has been proposed in the Ethiopian Education Development Roadmap (2018-2030). The Constitution of Ethiopia, adopted in 1995, stipulates the following provisions pertaining to education: the State has the obligation to allocate ever-increasing resources to provide for education and other social services (Article 41(4)); to the extent that the country's resources permit, policies shall aim to provide all Ethiopians with access to education (Article 90); and national standards and basic policy criteria for education shall be established and implemented (Article 51(3)). In addition, Proclamation No.41/1993, which defines the powers and duties of the central and regional executive organs, stipulates that the Ministry of Education has authority over national education policy and strategy (JICA 2012).

The 1994 Education and Training Policy created the possibility of the existence of private education institutions. There is no separate legislation in place for private education institutions, and their implementation is considered as any other private business investment.

9.2 Status of relevant policies

The Education and Training Policy, issued by the Ministry of Education in 1994, outlines the mission and goals for the education system of Ethiopia to achieve economic and social development goals (Hare 2007). Following this milestone policy, a series of strategies were issued by the Ethiopian Government and translated into successive programmes of action, known as ESDP I-V, to meet the educational goals of the nation. These successive ESDPs were also linked to the Education for All movement and the Millennium Development Goals. The implementation of these successive programmes focused on, among other things, improving access to and quality of education, providing adequate numbers of qualified teachers and upholding the quality of teacher training and development.

ICT is specifically mentioned in ESDP III (2005) in relation to the government's plan to embark on a fully fledged ICT capacity-building programme, including ICT for education. The programme aimed to provide fibre cable institutional networking in higher education institutions and the necessary ICT infrastructure to enable secondary schools to receive satellite education transmissions. ESDP IV (2010) planned to equip all secondary schools with the equipment necessary to access satellite television education and e-learning programmes in well-organized computer laboratories. The SchoolNet initiative was implemented under ESDP III and IV. ESDP V (2015) aimed to increase "the use of ICT in education by expanding and improving ICT infrastructure at all levels, producing and widely distributing digital education resources and building the ICT skills and capacity of teachers and leaders to support curriculum delivery". ESDP V identifies ICT as a means to improve the quality of teaching and learning in general education. GEQIP II is an ICT intervention aimed at improving learning conditions under ESDP V.

The Growth and Transformation Plan I (GTP I), a national development strategy launched from 2010 to 2015, identified the education sector as a key strategic pillar towards achieving the Millennium Development Goals by 2015 (Government of Ethiopia 2010b). GTP I had a long-term vision of transforming Ethiopia to a middle-income country by 2020–25. GTP I was followed by a second national development plan (GTP II), implemented from 2015 to 2020, where quality of education was a key priority. Both GTP I and II mention ICT development under capacity-building and make reference to the education sector as well as to overall social and economic development.

The Science, Technology and Innovation Policy, 2007, was developed in response to the rapid expansion of the education sector (Government of Ethiopia 2010c). Under the 2007 policy, education and human

resource development was identified as a key area of focus. It states that the national effort for rapid and sustainable socio-economic development critically depends on the quality and quantity of available trained human resources and on the awareness of the general public. This was complemented by the ICT in Education Implementation Strategy and Action Plan (Government of Ethiopia 2006), which recognized ICT as an integral part of the education system. The 2006 strategy has been replaced by an updated version of the National ICT Policy (Government of Ethiopia 2016).

The latest policy document pertaining to the education sector is the Ethiopian Education Development Roadmap for 2018–2030. Although the document appraises and evaluates the current education system well, it stops short of situating the Roadmap in the context of technological advancements and digitalization, and fails to position Ethiopia's education system in an increasingly knowledge-based and digital world. The Roadmap, for example, does not consider that several technological innovations and the use and integration of ICT have changed the way knowledge is accessed and delivered. It further neglects to propose the ways in which new technologies could be integrated in the education system to leapfrog efforts being made to achieve high learning outcomes to empower the burgeoning young population, bring about social justice and prosperity in the twenty-first century.

Major shortcomings and concerns related to policy implementation include:

- ▶ frequent and sudden policy changes experienced by the teacher education system, making it difficult to adapt and adjust;
- ▶ failure to address key cross-cutting issues such as ICT in the Ethiopian Education Development Roadmap;
- ▶ inaccessibility of ICT facilities and poor infrastructure;
- ▶ inadequate preparation of teacher candidates in the use of ICT for pedagogical purposes;
- ▶ lack of adequate access to ICT infrastructure;
- ▶ influence of politics on the recruitment and placement of management personnel in the education system;
- ▶ financial shortfalls in the education sector;
- ▶ absence of a comprehensive teacher preparation and development policy (Government of Ethiopia 2018a).¹⁴

9.3 Status of social dialogue mechanisms

Social dialogue is a vital mechanism for achieving the country's objectives of quality education for all. Teachers play a central role in implementing educational reforms, and without their full involvement it would be difficult to expect success. Currently, Ethiopia has more than a million people working in the education sector, with teachers being the largest workforce in the country as compared to other sectors. Teachers, however, continue to lack voice in decisions and policies impacting their work, despite their grounded experience.

In January 2019, a national-level dialogue was held between Prime Minister Abiy Ahmed and some 3,500 teachers from across the country. The ETA jointly organized the meeting with the Ministry of Education and played a role in selecting the teachers who would participate in the discussion, based on regional quotas. During the discussion, the ETA served as the secretary of the meeting. The agenda items were salary improvement, provision of housing and quality of education. At the end of the discussion, the Prime Minister made commitments with regard to salary increment and provision of housing for teachers. The commitments made were partly fulfilled and are partly in progress, according to the president of the ETA. The dialogue was a significant step in boosting the morale of teachers in the country.

¹⁴ The Roadmap (Government of Ethiopia 2018a, 44) recommends that a comprehensive teacher preparation and development policy be developed and launched and that it cover, among other things, "key issues related to recruitment, selection, in-service training, certification, continuous professional development, scholarship, deployment, relicensing, and transfer, termination of service, etc."

► 10. Support frameworks for teachers

With the aim of improving teacher preparation and development, various initiatives have been implemented over the past decades. The major initiatives include GEQIP I and the General Education Quality Improvement Programme for Equity (GEQIP-E), which have played a vital role in improving the supply and development of qualified teachers and in providing training and textbooks (Government of Ethiopia 2009, 2015a, 2018c). The use of ICT has been limited in these initiatives. As discussed in the preceding sections, GEQIP II is the most recent ICT intervention looking to improve the quality of educational services in secondary schools.

Over the years, the Ethiopian Government has made encouraging efforts to develop supportive frameworks and implementation strategies for the use of digital technology towards quality education. The major commitments, initiatives and projects launched include:

- The government has openly stated that digital transformation is the “highest priority” for the country.¹⁵ A new ICT policy on economic digitalization was approved by the Council of Ministers in March 2020, following the government’s decision to establish a hub for the Electronic World Trade Platform (eWTP) in Addis Ababa. The policy has been referred to Parliament for endorsement. According to the Prime Minister’s Office, eWTP will provide Ethiopia with access to advanced technology, infrastructure and services, as well as a customized regulatory framework intended to promote innovation in trade and in the digital economy.¹⁶ The implications for the education sector are twofold: the education sector will benefit from technological investment and innovation, and will also play a major role in developing the needed human resources.
- The WoredaNet initiative is a major e-government initiative that looks to connect all of Ethiopia’s local districts (woredas) and 11 regional capitals through the internet, telephone and videoconferencing. It was implemented by the Ethiopian Telecommunication Agency in 2003 with funding from the World Bank. The WoredaNet initiative provided internet connectivity for the national SchoolNet initiative, which has equipped 181 schools with a minimum of 15 networked computers per ICT laboratory, all connected to the internet (Hare 2007). The national SchoolNet initiative, in addition to focusing on the deployment and use of ICT to facilitate teaching–learning activities, supports school administration by allowing access to information, data and reports on teaching and learning experiences through the internet (Hussein 2018).
- The Satellite Plasma TV Project was launched in 2004, as part of the national SchoolNet initiative, in all high schools throughout the country. In 2015/16, the programme broadcast lessons in a number of subjects – biology, chemistry, physics, mathematics, civics and ethical education, economics, general business, technical drawing, English and Amharic – to 1,710 high schools (grades 9–12) across the country through a total of 15,600 plasma TVs (Hussein 2018; CEICT 2016).

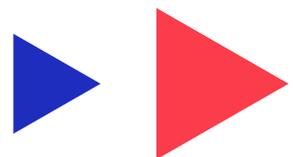
The supports needed to utilize digital technology in teacher training and development can be classified into four categories: (a) building the capacity of teacher trainers, teacher candidates and school management and leadership; (b) developing an appropriate curriculum that incorporates digital content; (c) selecting technologies appropriate to the local situation; and (d) upgrading infrastructural facilities and equipping schools with maintenance facilities. In order to enhance the skills and competencies of all involved in the teaching–learning process, the following interventions may be required:

- reforming teacher education and training to incorporate digital technology;
- reconceptualizing strategies for the professional development of teachers;
- developing competencies in instructional design for school teachers and programme experts;
- providing CPD opportunities for teachers to update their ICT and pedagogical skills;

¹⁵ Commentary in *The Reporter*, Addis Ababa, Ethiopia, 30 November 2019.

¹⁶ A memorandum of understanding was signed between the Alibaba Group, a Chinese e-commerce company, and the Ministry of Innovation and Technology in November 2019. According to the report, the economic digitalization benefits customers, producers, investors, exporters, importers, NGOs, civil society organizations, financial services, industrial services, mining, tourism, education and health sectors, among others.

- ▶ enabling collaboration between teachers and schools to exchange best practices;
- ▶ involving teachers in programme and policy design;
- ▶ providing training to principals and school administrators on the use and integration of ICT;
- ▶ highlighting the efforts of schools to implement ICT policies;
- ▶ establishing continuous monitoring and evaluation of ICT-based programmes;
- ▶ securing funding to undertake these initiatives.



► 11. Analysis of positive contributions and challenges

11.1 Contributions in the use and integration of digital technology in education

Although there is much to be done in terms of harnessing the possibilities of utilizing digital technology in education in general, the current report demonstrates that major efforts were launched to integrate digital technology in the teaching–learning process. This includes large-scale initiatives such as the national SchoolNet initiative, the Satellite Plasma TV Project and GEQIP II.

With the support of international donor organizations and other stakeholders, Ethiopia has also partnered on some initiatives to promote the use and integration of ICT for pedagogical purposes, focused on selected groups. The GIZ (2016) publication *Education in Conflict and Crisis: How Can Technology Make a Difference?* discusses a range of technologies for enhancing the quality of teacher training in various African countries. Among the various initiatives, some examples demonstrate the use of digital technology in strengthening education systems, teacher training and inclusive education. Relevant examples are presented below (GIZ 2016, 43–61).

- FHI 360's K-Mobile programme, which was implemented in partnership with the United Nations High Commissioner for Refugees (UNHCR) in Ethiopia and other countries, was a locally connected data collection software tool that allowed administrators to document the number of teachers, schools and students in the country. The same software was used to map and detail refugee education offerings and the state of infrastructure in use. The target groups included schools in refugee camps, policy-makers and development field workers. The purpose of the intervention was to facilitate the collection of educational data on 16 critical education indicators about schools in refugee camps and selected urban areas where field teams use Android-based tablets or smart phones with the K-Mobile schools application. Once the data was uploaded from the tablets or phones using standard internet hotspots, development organizations and policymakers could view the schools, along with key performance indicators and operating information.
- The Badiliko project, which was implemented by the British Council and Microsoft in Ethiopia and in other countries, targeted school-aged children and their teachers. The purpose of the intervention was to build digital hubs at schools and provide a cascade model of professional development for teachers and school leaders. The intervention utilized ICT technologies, online learning technologies, satellite broadcast technologies and internet connectivity.
- The Worldreader project, which was implemented by the Stavros Niarchos Foundation and Opera Software in Ethiopia and many other African countries, focused on children and their families. Worldreader aimed to provide e-books and digital reading applications in localities where access to reading materials is limited by employing e-reader and tablet technologies.

Mobile phones are increasingly affordable and accessible to a significant segment of the population in Africa. Mobile-based solutions can help to compensate for the lack of infrastructural facilities, which has been a challenge in Ethiopia.

11.2 Challenges in the use and integration of digital technology in education

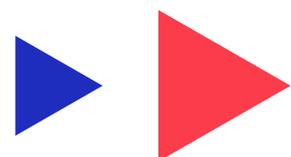
The use of digital technology in schools can transform the present teacher-centred and book-centred learning environment into a more student-driven model. Studies conducted on the use of digital technology in secondary schools in Ethiopia show that teachers lack appropriate ICT training and that their ICT skills are deficient (Hare 2007; Berhanu 2016; Hussein 2018). Major challenges schools face in relation to ICT

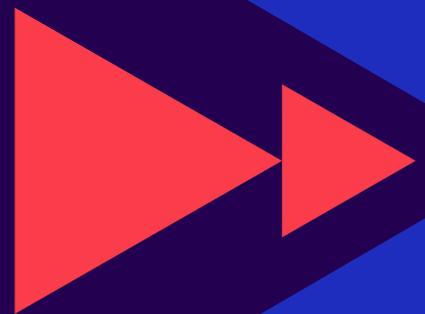
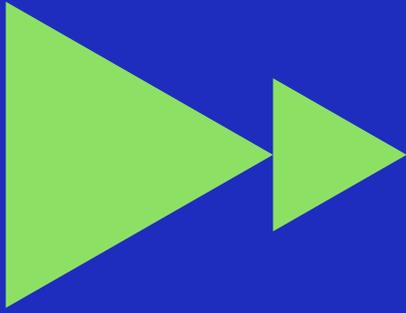
use and integration include absence of appropriate ICT infrastructure; limited ICT knowledge and skills on the part of teachers and students; inadequate time allocated for in-service and CPD courses; inadequate funding for CPD training; inadequate computer facilities; limited technical support during the teaching and learning process; lack of internet connectivity and back-up during power interruptions in rural areas; lack of appropriate school policies on the use of technology; shortage of budget and training materials; lack of commitment of the school leadership; frequent power interruptions; internet and telecommunication shutdowns during political unrest; shortage of small replacement parts for damaged or used technology; and lack of interest and motivation on the part of some teachers to adopt new technologies.

Lack of awareness about the potential benefits of ICT use in the education sector is also a major hindrance to its adoption. The change from the traditional mode of teaching and learning to a more digital mode of transmission constitutes a challenge. Many African countries lack a shared understanding of the potential of education technology and what the integration of digital technology entails (Mwenifumbo 2016). Digitalization is a costly process that demands competent human resources, and it can often benefit certain groups and areas more than others. The digital divide (between urban and rural, younger and older generations and people with different economic backgrounds) is yet another challenge that Ethiopia and many other countries will have to address. These challenges have far-reaching repercussions in achieving quality education for all and in building a vibrant workforce that is responsive to the labour force demands of the twenty-first century.

In order to address such challenges, there is a need to mobilize resources from partners and support from NGOs and international donors. There has been some support from Canada, Germany, Japan, the Republic of Korea and NGOs. The support mobilized for TVET, however, has been minimal compared to other education subsectors. The sector is characterized as having a weak resource mobilization strategy (Government of Ethiopia 2018a, 78).

The Ministry of Science and Higher Education and the Federal TVET Agency acknowledge that these challenges can only be addressed through close collaboration with international and development partners. GIZ, for example, has played a key role in supporting the TVET subsector through the Sustainable Training and Education Programme (STEP), which is an education and skills development programme that improves the employment prospects of young Ethiopians by promoting quality and relevance in vocational training. STEP has four areas of focus: (a) skill development, including digital literacy; (b) matching supply and demand via sector dialogue and private sector engagement; (c) institutional capacity development, such as providing TVET teachers and in-company trainers' training; and (d) education policy support by supporting the revision of education policies and strategies and developing a resource mobilization strategy. The planned duration of the programme is three years (2018-2021).





► References

- Berhanu Abera. 2013. "The Plasma-based Instruction in Ethiopia: Utopia or Dystopia?" *Educational Research and Reviews* 8 (24): 2325–2338.
- . 2016. *Some Latent Problems for Utilizing the Plasma-Based Instruction in Ethiopia*. Addis Ababa, Ethiopia.
- CEICT (Centre for Educational Information and Communication Technology). 2016. *A Study on the New Satellite Television Content Programs in the Secondary Schools*.
- Gebremariam Mesfin. 2004. "Integration of Computer Assisted Learning into the Curricula of Ethiopian Schools." MA thesis. Addis Ababa University.
- GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit). 2016. *Education in Conflict and Crisis: How Can Technology Make a Difference? A Landscape Review*.
- Gizealew Alazie and Sisay Ebabeye. 2019. "Current State of the Art Digital Literacy in Ethiopia: A Critical Review." *International Research Journal of Multidisciplinary Studies* 5 9: 1–10.
- Government of Ethiopia. 1997. *First Education Sector Development Programme (1996/97–2001/02): Programme Action Plan*. Ministry of Education.
- . 2002. *Second Education Sector Development Programme (2002/03–2005/06): Programme Action Plan*. Ministry of Education.
- . 2005. *Third Education Sector Development Programme (2005/06–2009/10): Programme Action Plan*. Ministry of Education.
- . 2006. *National ICT for Development (ICT4D): Five Year Action Plan for Ethiopia (2006–2010)*. Ministry of Capacity Building; unpublished report.
- . 2009. *General Education Quality Improvement Programme I (2009–2013)*. Ministry of Education.
- . 2010a. *Fourth Education Sector Development Programme (2010/11–2014/15): Programme Action Plan*. Ministry of Education.
- . 2010b. *First Growth and Transformation Plan (GTP I) (2010/11–2014/15)*. Ministry of Finance and Economic Development.
- . 2010c. *Ethiopian Science and Technology Growth and Transformation Plan (2010/11–2014/15), Volume I*.
- . 2013. *General Education Quality Improvement Programme II (2013–2018)*. Ministry of Education.
- . 2015a. *Fifth Education Sector Development Programme (2015/16–2019/20): Programme Action Plan*. Ministry of Education.
- . 2015b. *Second Growth and Transformation Plan (GTP II) (2015/16–2019/20)*. National Planning Commission.
- . 2016. *National Information and Communication Technology (ICT) Policy and Strategy*. Ministry of Communication and Information Technology.
- . 2018a. *Ethiopian Education Development Roadmap (2018–30): An Integrated Summary*. Ministry of Education, Education Strategy Centre.
- . 2018b. *Education Statistics Annual Abstract 2017/18*. Ministry of Education.
- . 2018c. *General Education Quality Improvement Programme for Equity (2018–2022)*. Ministry of Education.
- . 2019. *Education Statistics Annual Abstract 2018/19*. Ministry of Education.
- . 2020a. *Sixth Education Sector Development Programme (2020/21–2024/25): Programme Action Plan*. Ministry of Education.
- . 2020b. *Education Sector Ten-Year Strategic Plan (2020–2030)*. Ministry of Education.

- Hare, Harry. 2007. "Survey of ICT in Education in Ethiopia." In *Survey of ICT and Education in Africa (Volume 2): 53 Country Reports*. Washington, DC.
- Hussein Said Aragaw. 2018. "Practices, Challenges and Prospects of SchoolNet Implementation in Secondary Schools in Addis Ababa City Administration." MA thesis. Addis Ababa University.
- JICA (Japan International Cooperation Agency). 2012. *Basic Education Sector Analysis Report: Ethiopia*.
- Kim, Sung-Wan, and Gebeyehu Bogale. 2014. "Does Satellite Program Satisfy Ethiopian Secondary School Education?" In *International Conference e-Learning 2014*: 79–86.
- Kurt, Serhat. 2019. "TPACK: Technological Pedagogical Content Knowledge Framework." *Educational Technology* website. Available at: <https://educationaltechnology.net/technological-pedagogical-content-knowledge-tpack-framework/>, accessed 4 November 2020.
- Mishra, P., and M.J. Koehler. 2006. "Technological Pedagogical Content Knowledge: A Framework for Integrating Technology in Teachers' Knowledge." *Teachers College Record* 108 (6): 1017–1054.
- Mwenifumbo, Lusayo. 2016. *Digital Media Training for Pre-service Teachers: A Comparison from a TTC in Malawi and a University in Massachusetts*. University of Massachusetts, College of Education, Center for International Education.
- Temechegn Engda. 2011. *ICT-enhanced Teacher Development Model*. Addis Ababa, Ethiopia: UNESCO-IICBA.
- Temtim Assefa. 2017. "Educational Technology Implementation in Ethiopian High Schools: Benefits and Challenges of the Instructional Plasma TV." In *Handbook on Digital Learning for K-12 Schools*, 413–427.
- Teshome Nekatibeb Begna. 2017. "Public Schools and Private Schools in Ethiopia: Partners in National Development." *International Journal of Humanities, Social Sciences and Education* 4 (2): 100–111.
- UNESCO (United Nations Educational, Scientific and Cultural Organization). 2003. *Education Management Information Systems (EMIS): An Overview*. Harare, Zimbabwe: NESIS.
- . 2010. *World Data on Education, 7th Edition*.
- . 2018. *A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2*. UNESCO Institute for Statistics.
- UNESCO-IICBA (International Institute for Capacity Building in Africa). 2020. *Policy Brief on Teacher Motivation*.

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