Teacher Development for the 21st Century (TDev21) pilot
A Ministry of Education and Vocational Education Tanzania,
World Bank and GESCI Initiative

ICT Competency Framework for Teachers in Tanzania

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1. INTRODUCTION AND CONTEXT

Teacher Development for 21st Century (TDev21)

From January to June 2011, the Tanzanian Ministry of Education and Vocational Training (MoEVT) implemented the ‘Teacher Development for 21st Century (TDev21)’ pilot. The initiative is supported jointly by the World Bank\(^1\) and Global e-Schools and Communities Initiative (GESCI). The broader objective of TDev21 is to build teacher capacity in Sub Saharan Africa for effective use of technology, particularly Information and Communication Technologies (ICT), in education. More specifically, the program seeks to implement a globally-benchmarked competency framework for teachers at pre-service and in-service teacher training level. The ultimate objective is to allow teacher entering or teaching in classrooms has minimum competencies not only for technology use but in pedagogy.

In the pilot stage that was implemented in Tanzania, the goal was to accomplish a critical task: contextualizing the global ICT Competency Framework for Teachers in Tanzania. A secondary objective of pilot is to build capacity among a core group of national facilitators for roll-out of standards at pre- and in-service teacher training level.

The challenge is both of quality and quality of teachers. Though ICT training is available for teachers, it is usually ad-hoc and short-term, and there is an absence of a comprehensive framework of standards that guides quality and learning outcomes.

The program’s goal is piloting a framework of teacher competency standards for ICTs in Tanzania. ICT standards for educators have only recently started to emerge, and no such standards have been adopted in Sub-Saharan Africa yet. The framework used by this program is the ICT Competency Framework for Teachers (ICT-CFT) developed by UNESCO by educational and private sector partners in 2008. The framework covers six areas of standards, taking a holistic view of ICT competencies that go beyond basic e-literacy. A country can contextualize and use this universal framework. It is also possible take a regional approach to this universal framework.

In support of this goal, TDev21 pilot had three stages:

- Stage 1 – Needs assessment and mapping the landscape through situational analysis
- Stage 2 – Contextualizing and ICT competency framework for teachers in Tanzania
- Stage 3 – Building capacity among core group of facilitators for implementing ICT-CFT

Context: Education system and challenges in Tanzania

Tanzania has made significant progress in education. The literacy rate for the nation has increased from around 60% in 1980 to 73% in 2009. Biggest gains have been made at primary level. Gross enrolments in the primary education were recorded at 106.4%, in 2010 with a comparative 47.3% in secondary schools. This is also evidenced by the fact that there are 4,266 secondary schools with 1,638,699 students as compared to 15,816 primary schools with 8,419,305, pupils (BEST, 2010). In addition to expansion in the formal system, the Government implemented two main Adult and Non-Formal Education programs, viz. ICBAE and COBET. According to the National Report of the United Republic of Tanzania on the Development of Education (MoEVT, 2008) more than half a million out-of-school children have been able to get primary education through the COBET program. The same

\(^1\) World Bank’s New Economy Skills for Africa Program—Information and Communication Technologies (NESAP-ICT)
The redeployment methodologies, sometimes authorities role inadequate. Despite devolvement has been unable, high student: teacher and student: learning materials ratios and lack of adequate infrastructure. As a result of under-qualified teachers in the system, teachers are sometimes unable to teach topics that are otherwise deemed difficult to teach due to lack of subject content knowledge.

Access

The rapid increase in access to primary education as a result of the successful implementation of PEDP resulted in a very high demand for secondary education. Access to secondary education has been addressed to a large extent through SEDP I (2004-2009) which has been extended to SEDP II (2010-2014). The challenge of access has further been addressed through offering education courses by the various universities and also the adoption of licensed teachers. However, all these measures have not been able to counter the effect of dropping standards of education which have resulted to poor quality. This is especially the case in secondary education and in particular in the Science and Mathematics subjects. This can also be explained by the fact that secondary education teachers specialize in two subjects whereas, primary teachers can teach all subjects.

Quality

The standard and quality is reflected in the progression rates, repetition rates, poor performance in the science and math subjects, limited access to textbooks a large number of under-qualified teachers and high student to teacher ratios in the sciences especially in secondary education These challenges are progressively being addressed with notable improvements. As noted in the Tanzania Human Development Report (UNDP, 2000), one of the goals of BEMP was to raise performance, decrease student to teacher ratios, rationalize teacher workloads for greater efficiency, and shift the salary: no-salary spending from 93:7 to 80:20 by 2002. This was to be achieved through redeployment of teachers, devolving authority and resources of school to Local Government Authorities and involvement of communities in the development of school infrastructures. The devolvement of education resources has taken place according to findings during this study. However the student to teacher ratios have remained high especially in the science subjects for a number of reasons: (1) the uptake of science subjects is very low in secondary schools and as such the system as a whole is highly starved in those who can take science as a subject in teacher training colleges or universities (2) the science teachers often leave the teaching profession especially because of the high demand of those who have science backgrounds in all sectors; and (3) a large number of teachers are furthering their education in various institutions where the mode of training employed is largely in-campus based. This means that most of the teachers are absent from schools.

Trends in ICT and Education in Tanzania

There is a strong policy focus on ICT and Education. The National ICT Policy of 2003 recognizes the role of ICT can play to ‘enhance education, including curriculum development, teaching methodologies, simulation laboratories, life-long learning and distance education and for teaching of
not only ICT, but of all subjects and specializations.’ Furthermore, a distinct framework for linking ICT and Basic Education has been developed in the form of ICT Policy for Basic Education (2007). A multi-stakeholder consultation process for providing policy advice on technology integration resulted in an ICT guideline (also referred to as ‘White Paper’) called ‘Thinking through the use of ICT in Secondary Education in Tanzania - Deliberations of a multi stakeholder work group on education.’ This policy framework presents guidelines for system wide ICT integration in basic education covering pre-primary, primary, secondary, and teacher education as well as non-formal, adult education and university education. Tanzania is also a signatory to the WSIS Declaration of Principles and Action Plan that aims to build a people-centered, inclusive and development-oriented Information Society.

At secondary level, several ICT and Education initiatives have been launched. These include: the e-Schools forum formed in 2005 which had proposed a phased approach for ICT in secondary schools, starting with 200 schools in phase 1, followed by a large scale roll out covering 2000 schools in phase 2 in a period of 5 years with a target of having all schools with ICT in 2015. Another planned intervention is through the NoPC pilot project which targets the provision of ICT to 200 secondary schools which are close to Teacher Colleges to improve the teaching of Math, Science and English. According to NoPC (UK), the NoPC solution transforms traditional computing, taking “thin” to a whole new level, greatly reducing the need for maintenance, support and upgrades. This solution has been said to be energy and cost-efficient PC substitution, eliminating high failure components, requiring little bandwidth and using under 100 watts for five workstations. With over 3,500 secondary schools in Tanzania, NoPC hoped to install computer systems in all of them providing Internet for over 1.2 million children to improve their academic experience. Other initiatives have been listed under the stakeholders section (5.4). It is hoped that the latest strategy under the TBT will centrally anchor all these and future ICT in education initiatives under the MoEVT.

To harmonize various ICT and Education initiatives at basic level, “Tanzania Beyond Tomorrow” is a new strategy being developed by MoEVT to define an E-Education Program for Basic Education for 2011-2020. The TBT mission is to improve access, equity and quality in the delivery of basic education through integration of ICT in teaching and learning. Key objectives of TBT are: to identify all initiatives of ICT in basic education in order to harmonize and integrate them into a unified framework, to enhance the use of appropriate ICT in education, and to provide and improve appropriate ICT infrastructure to support teaching and learning in basic education.

**Teachers: an urgent challenge**

A shortfall of 45,000 teachers is estimated at secondary level. Qualified Teachers for secondary education are those with diplomas from Teachers’ Colleges and above. Teachers in secondary schools can only teach two subjects whereas those in primary schools can teach all the subjects. The ratio of qualified teacher to student is 1:40 per subject with some regions having a ratio of 1:80. The low teacher to student ratio is mostly in the Science and Mathematics subjects in the rural and remote areas. There is an uneven distribution of teachers in the regions and in the different schools. Teacher attrition rates in secondary education are at 3.8%. Out of this 67.3% leave the profession because of termination whose causes include dismissal, change of employment, illness and resignation.

To build teacher capacity, government has prioritized teacher training as a focus area. The implementation of ICTs in Teacher Colleges was started in 2005 as a joint undertaking MoEVT and the Swedish International Development Agency (Sida). The project’s main goal was to improve on the quality of pre-service and in-service teacher education by using ICT. In the first phase, all 34 Governmental colleges received 30 thin client computers and a server including peripherals and accessories, ICT training for education administrators, all tutors were trained in the use of ICT for
teaching and learning which according to interviews translated to basic literacy skills. 2-4 tutors in each college were certified in CISCO IT essentials. A commercial ISP supplies the required bandwidth to all the colleges on contract basis.

There are also other initiatives to use ICTs for teacher training. For example, an ICT-based in-service teacher education project for secondary school teachers providing training on pedagogy and subject specialized education was developed by the Mid Sweden University (MiUn) which has a vast experience of distance education, flexible learning and teacher training and the MoEVT. The project is also supported by the Open University of Tanzania (OUT) and the University of Dar Es Salaam (UDSM). The overall purpose of the project was to enhance the performance of the secondary teachers by providing training on pedagogy and subject specialized education. The teachers will be trained through ICT-based short courses which will be tailored to the needs of teachers in particular subject areas.

The government has made an effort to define a roadmap for integration of ICT in teacher training. In this context, MoEVT has developed a Framework for ICT Use in Teacher Professional Development in Tanzania (2009), mapping how to address teacher shortages in key subjects (Mathematics, Science and English), teacher quality and teacher support using the existing ICT infrastructure in the Teacher Colleges (TCS) for pre-service and in-service programs and on-going learning of teachers. But there is no comprehensive framework of standards to guide capacity building of teachers in ICTs.

This is where the present intervention becomes important.

Teacher Colleges, with improved ICT infrastructure, are offering ICT training for trainee teachers. But most accounts suggest that training is for basic ICT skills. There is no focus on broader competencies that allow teachers to apply ICTs in teaching and learning. Teacher Development for 21st Century (TDEV21) is a potential vehicle for addressing this next step.

As part of the pilot initiative Teacher Development for the 21st Century (TDev 21) between Ministry of Education and Vocational Training (MoEVT), the World Bank (WB) and the Global E-Schools and Communities Initiative (GESCI), a contextualized ICT Competency Framework for Teachers in Tanzania has been developed through an intensive consultative process.

**Rationale for ICT Competency Framework for Teachers in Tanzania**

There is a commonly accepted view that Education systems will need to effect changes to prepare citizens for lifelong learning in the emerging 21st Century Knowledge-Based Societies. The global shift towards Knowledge-based Economies will require a change in the traditional view of the learning process itself. It will require an understanding of how traditional (text based) and new (digital based) classroom technologies can be used to facilitate learning environments in which students are engaged in the kind of team and project work that can enable them to take greater responsibility for their own learning and construction of knowledge. It will require a ‘reconceptualization’ of teacher professional learning for a digital age.

Competence with technology integration is the basis for effective change. Teachers will need to lead by modeling effective ICT skills and lifelong learning strategies. Students will need to see their teachers applying technology in authentic and integrated ways that will enable students to engage in problem solving, project collaboration and in creatively extending their abilities and capacities to learn and construct knowledge.
In November 2008 the UNESCO ICT-Competency Framework for Teachers (ICT-CFT) (UNESCO 2008) project was launched marking the culmination of many attempts made by governments, academia, and the private sector to establish a universal terminology and competencies for ICT use in teacher development. The framework promotes a teacher development model for effective ICT integration across six education system domains of Policy, Curriculum and Assessment, Pedagogy, ICT, Organization and Administration and Teacher Development.

ICT competencies or standards are descriptions of what a qualified teacher should know and be able to do with technology in educational settings.

The adoption of an ICT competency framework has a number of advantages, listed in table 1:

**Table 1: Advantages of an ICT Competency Framework for Teachers**

<table>
<thead>
<tr>
<th>Clarity</th>
<th>It will be clear for all to see what is required of a qualified teacher in terms of knowledge, skills, behaviors and attitudes for ICT use in educational settings.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehensiveness</td>
<td>All pre-service teacher education institutions will need to make sure that they graduate teachers to meet the required level standards of those competencies (beginner, applying, proficient or transformative competency levels); All in-service providers will have to ensure that they provide ICT professional development programs which meet national priorities as expressed in the competency framework (beginner, applying, proficient or transformative competency level priorities)</td>
</tr>
<tr>
<td>Minimum Standards</td>
<td>Student teachers, practicing teachers, administrators, teacher educators and other educators will be able to see the minimum ICT competencies required of them and will be able to place efforts towards achieving and maintaining those standards.</td>
</tr>
<tr>
<td>Content and pedagogy</td>
<td>A competency framework can focus ICT integration on transformative practices at the classroom level; where technology integration changes content as well as pedagogy (what students learn as well as how they learn)</td>
</tr>
<tr>
<td>Systemic Transformation</td>
<td>A competency framework can focus ICT integration on transformative practices at the systemic level: leading to changes in the organizational and structural features of course provision</td>
</tr>
<tr>
<td>Confidence in teachers</td>
<td>The general public can be confident that students are being taught by educators who have achieved agreed and transparent ICT competency standards.</td>
</tr>
</tbody>
</table>
A Conceptual Framework for ICT Integration

In planning for ICT integration in education, policymakers need to begin by clarifying overall national education policy, objectives and approaches, as this should serve as the rationale and road map for technology integration in their education systems.

Farrell and Wachholz (2003) found three different approaches being used in Asia Pacific countries, for ICT integration in teaching and learning, namely: (i) teaching ICT as a subject in its own right, usually beginning at the upper secondary level, to develop a labour force with ICT skills; (ii) integrating ICTs across the curriculum to improve teaching and learning; and (iii) using ICTs to foster learning anywhere and anytime as part of the development of a knowledge society in which all citizens are ICT savvy.

Ng et al. 2008 identify four broad approaches from the research literature for developing a model for ICT integration in Teacher Development. The adoption model depicts an approach *continuum* whereby the skills of teachers flow from *emerging* to *applying* to *infusing* to *transforming* stages of ICT integration. As teachers move through each stage, they develop increasing capability to integrate ICT in their day-to-day activities and master the use of ICT as an effective tool for teaching and learning (Figure 2).

Figure 1: A Continuum of ICT Integration Approaches in Teacher Development

![Continuum of ICT Integration Approaches](image)

<table>
<thead>
<tr>
<th>Emerging</th>
<th>Applying</th>
<th>Infusing</th>
<th>Transforming</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to use ICT at a basic level</td>
<td>Ability to make general and specific uses of ICT</td>
<td>Ability to make dynamic and complex use of ICT</td>
<td>Ability to experiment and innovate with ICT</td>
</tr>
</tbody>
</table>

Source: Ng, Miao & Lee (2008)

In the *emerging stage*, the teacher development focus is on the use of ICT as an add-on to the traditional curricula and standardized test systems. Teachers and learners are discovering ICT tools and their general functions and uses, and the emphasis is usually on basic ICT literacy and skills.

In the *applying stage*, the focus is on the development of digital literacy and how to use ICT for professional improvement in different disciplines. This involves the use of general as well as particular applications of ICT.

In the *infusing stage*, the teacher development focus is on the use of ICT to guide students through complex problems and manage dynamic learning environments. Teachers are developing the ability to recognize situations where ICT will be helpful, and choosing the most appropriate tools for a particular task, and using these tools in combination to solve real problems.

In the *transforming stage*, the learning situation is transformed through the use of ICT. This is a new way of approaching teaching and learning situations with specialized ICT tools. Teachers are themselves master learners and knowledge producers who are constantly engaged in educational experimentation and innovation to produce new knowledge about learning and teaching practice.
Progression through the stages takes time. And the transformation of pedagogical practice requires more than ICT skills training for teachers. Too often the approach taken to teacher development in ICT integration is the one-off crash course on computer literacy. This approach does not enable teachers to integrate ICT in their day-to-day activities and master the use of ICT as an effective tool for teaching and learning. Ministries of Education need to adopt a new framework for teacher development that reflects the prevailing international and regional shifts from ‘training’ to ‘lifelong professional preparedness and development of teachers’ on new modalities of professional development (ibid.).

**ICT-Competency Framework for Teachers (ICT-CFT)—an Introduction**

This section throws light on ICT-CFT, which is the key reference framework used for developing teacher competency standards in Tanzania.

**What is ICT-CFT?**

ICT-CFT is a comprehensive framework of competencies needed in 21st century teachers. ICT-CFT is a global framework of standards covering 15 skill areas for teachers in five educational domains, in 3 progressive levels. It is global and any country can deploy this framework based on its own needs and context.

**Figure 1: ICT Competency Standards for Teachers Framework, Source: UNESCO 2008**

The framework can be deployed at pre-service and in-service teacher training level, as a benchmark against which teachers are trained, assessed, and certified. ICT-CFT is not just about technology but represents holistic competencies in teachers for content, pedagogy, administration and leadership.

The ICT Competency Framework for Teachers (ICT-CFT) was designed by UNESCO in cooperation with Cisco, Intel and Microsoft, as well as the International Society for Technology in Education (ISTE).

**What are the objectives of ICT-CFT?**

- To constitute the common core syllabus (defining various ICT competency skills for teachers) which professional development providers can use to develop learning material sharable at global level.
To provide a basic set of qualifications that allows teachers to integrate ICT into their teaching

To extend teacher’s professional development so as to advance their skills in pedagogy, collaboration, and school innovation using ICTs.

To harmonize different views and vocabulary regarding the uses of ICTs in teacher education.

**How is ICT-CFT implemented by a country?**

ICT-CFT is a theoretical framework. To apply these standards within the teacher training system, a country must typically undertake these steps:

- Assessing the existing level of teachers’ ICT skills viewed from a pedagogical perspective of using technology to improve the teaching and learning experience. There are no common diagnostic tools available or in place and in most cases the few ICT trainings (that are conducted mostly as one-offs) do not focus much on the existing skills in place but rather just start from the beginning over and over. This approach leads to a lot of repeat trainings and makes it difficult to put a continuous professional development program in place, especially for in-service teachers.

- Mapping those existing ICT skills levels to the ICT-CFT in order to establish what is already existing and determining the specific modules that need to be integrated into the curriculum of pre-service and in-service teacher professional development programs.

- Identifying the starting point - in many cases, especially in Sub Saharan Africa, the CFT’s entry level is already considered too difficult and there is a need to introduce a basic ICT skills certification program as a qualifying before teachers are inducted in the CFT.

- Contextualizing the framework to the specific needs of a country and establishing learning journeys within the framework for continuous professional development of teachers. This work has so far been done on an ad hoc basis by many different agencies as no proper guidelines or methodologies are in place.

- Developing or sourcing the content once the CFT has been contextualized to address the national priorities. UNESCO does provide the basic syllabus for each of the training modules of the CFT but original content needs to be generated by the local authorities or sourced from any aligned international provider.

- Building capacity amongst local content providers to start developing linguistically and culturally localized content for the ICT-CFT. While international content providers have already begun developing content that is somehow aligned with the ICT CFT, it is important that such content can at least be customized or localized in order to fit the context within which it is taught. Many developing countries seriously lack the institutional or technical capacity and support to their curriculum developing agencies or officers is crucial. Ideal would be if they create their own training content.

- Establishing a robust and foolproof assessment and certification mechanism with the capacity of scaling up to a national level. This component of CFT deployment remains to be piloted and requires some good thinking.
Training and capacity building within the ministries of education at both policy and operational level. Perhaps even building regional platforms for the national deployment agencies to get together to collaborate and share experiences.

2. METHODOLOGY for CONTEXTUALIZATION

The key goal of pilot was to contextualize the ICT-CFT for Tanzania. To accomplish this, the following methodology was used:

**Stage 1: Needs assessment and situational analysis**
Stage 1: Needs assessment and situational analysis

The needs assessment was conducted with the following goals in mind.

A. Scanning the ICT teacher development landscape to examine existing ICT teacher training policies, strategies, programs, standards (if any), curriculum, content, delivery mechanisms, evaluation and assessment among others both at in-service and pre-service levels. The scan would be used to determine the contribution of ICT competency standards in Tanzania.

B. Conducting a stakeholder analysis to determine key national counterparts for the initiative in consultation with the Ministry of Education.

C. Determining at what level (primary, secondary or tertiary including vocational training) to pilot the competency standards.

D. Identifying teacher training institutions to target for piloting the competency standards and assessing the ICT infrastructure and systems in these institutions.

The needs analysis was conducted in two phases: a desk study followed by a field study in Tanzania in the period of January 31-February 11, 2011.

Desk Review: The purpose of this stage was to generate a knowledge base about the general status of ICT in education and teacher development in Tanzania. This stage consisted of reviewing existing literature, reports, comparable work done in other countries, websites and available data.

Field Survey: This stage, conducted over a period of two weeks, collected more in-depth data and information about the ICT in education and teacher development landscape in Tanzania, gathering information through interviews and consultation with actors from the education and teacher development national sectors, agencies and institutions. The key tools used during field research were:

- Interviews conducted with key informants in ministries, national institutions and agencies, state colleges and local schools for duration of between 45 minutes to one hour.
- Focus group discussions conducted with lecturers, teachers, student teachers and students.
- Surveys on stakeholder importance and prioritization ratings of UNESCO ICT teacher competency standards.
- Questionnaires to verify status of ICT infrastructure in Colleges of Education and schools.

Stage 2: Contextualization of the Global ICT-CFT Framework

The contextualization was a two step process:
(1) Formulation of a roadmap tool for ICT competency standards for teachers

The goal of developing a roadmap tool was to have a baseline framework ready for contextualization. The roadmap was thus the starting point of contextualization process. The steps involved in creation of roadmap were:

(a) Various international and national frameworks were consulted during the creation of roadmap tool. The frameworks reviewed during roadmap development were:
   - ISTE: National Educational Technology Standards for Teachers (NETS-T)
   - UNESCO: ICT Competency Framework for Teachers
   - Australia: ICT Competency Framework for Teachers
   - Dutch ICT Knowledge Base
   - Teachers Competencies and Qualifications Framework for EU countries
   - ICT-enhanced Teacher Standards for Africa
   - South African ICT Teacher Development Framework

(b) A new “emergent” level was added to the UNESCO ICT-CFT framework so that the roadmap would be more inclusive to schools and institutions that were just beginning to engage with ICT. Each competency domain was divided into sub-domains (e.g. policy - policy awareness; classroom practice). A progression path was mapped of key performance indicators and benchmarks to describe increasing levels (beginning, applying, proficient & transformative levels) of teacher attainment in the full implementation of each competency sub-domain and approach. A number of gaps were identified where there was not a relevant UNESCO statement for a particular sub-domain. New statements were drafted which were consistent with the nearest UNESCO competency statement (Table 1).

**Table 1: Extract from the ICT Teacher Competency Roadmap**

<table>
<thead>
<tr>
<th>Competency domains &amp; sub-domains</th>
<th>Performance Indicators Teachers…</th>
<th>Emergent Beginning Teachers…</th>
<th>Technology Literacy Applying Teachers…</th>
<th>Knowledge Deepening Proficient Teachers…</th>
<th>Knowledge Creation Transformative Teachers…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy awareness</td>
<td>research, evaluate and support school and national policy and vision for ICT integration across all subject areas</td>
<td>identify and evaluate local, national and global vision for technology integration in education and development</td>
<td>contribute to the development of a shared school vision and planning for ICT integration that is based on national policy.</td>
<td>discuss and work collaboratively with others for vision and planning implementation that focuses on exploring new and more effective approaches for ICT integration across all subject areas in the school and wider community.</td>
<td>help embed school/ district/ national policy and vision for ICT integration by applying it in their daily work and engaging with students in innovative and exemplary practice.</td>
</tr>
<tr>
<td>Classroom Practice</td>
<td>design, adapt and develop</td>
<td>create lesson plans with a basic reference</td>
<td>identify key characteristics of classroom</td>
<td>identify key concepts and processes in</td>
<td>design, implement, and modify school/…</td>
</tr>
</tbody>
</table>


contextualize through the use of ICT. Teachers are themselves master learners and knowledge producers who are constantly engaged in educational experimentation and innovation to produce new knowledge about learning and teaching practice.

(2) Contextualizing the roadmap through a consensus building process

A national workshop was held in the Peacock Hotel, Dar-es-Salaam between 10th and 13th May 2011. The strategic objective of this workshop was to review existing competency frameworks and contextualize ICT competency standards for teachers in Tanzania; and to create a team of master trainers who in turn would adapt and mainstream the standards at the national level.

The facilitation team presented Standards for Standards: that is, criteria of clarity, scope and relevance against which workshop participants could measure whether the Roadmap ICT Teacher Competencies based on the UNESCO competency framework were clear, sufficient in terms of content as well as applicable and relevant to the Tanzania context.

Participants further discussed the parameters for implementing ICT competencies for teachers in Tanzania in relation to: whether the competencies should be generic or subject-specific; whether they should be targeted at pre-service or in-service; whether they should be developed for teachers, administrators or teacher educators, or any other group. The discussion generated reflections on how the contextualized competencies might be used and owned as well as obstacles to their use.

Stage 3: Capacity Building for Deployment of ICT-CFT

Finally, capacity was built among a core group of national facilitators, who could potentially help deploy the ICT-CFT at pre-service and in-service teacher training levels. Capacity building focused on three areas:

1. Familiarization with the teacher competency standards: National facilitators were familiarized with the competency framework for teachers. ICT-CFT objectives and domains were explained. Various international and regional frameworks of competencies were also made available for reference.

2. Mapping digital content against ICT-CFT framework: ICT-CFT modules require digital content for training teachers. National facilitators were exposed to digital and multimedia learning resources. Content was sourced from three places: locally developed content, content by private providers, and content from the open source domain.

3. Assessment and certification options. National facilitators were also exposed to options through which pre-service and in-service teachers can be assessed and certified. The assessment and certification can happen through a proctored test environment (such as through a new beta version of assessment being prepared by Microsoft).

The next sections of this report present the key outputs of the TDEV21 pilot in Tanzania.

3. ICT AND EDUCATION LANDSCAPE IN TANZANIA

Status of ICT Integration across the Education system
Currently the use of ICT in Education is more prevalent in urban private schools. In government schools it is mostly confined to secondary schools where there is limited teaching of basic ICT skills and no integration into the teaching and learning process. About half of the government registered secondary schools in Tanzania are in rural areas with poor information and communication infrastructure. According to Tilya (2007), some parents from state-owned secondary schools in which the government could not install ICT equipment showed keen interest in and support to the acquisition of ICT facilities for the schools even when they had to contribute financially to the acquisition of ICT facilities.

**ICT in Primary Schools**

There are no statistics on ICTs in the primary and secondary school systems. Consequently it remains unclear how many and what types of ICT may be in primary and secondary schools. However, there are plans to have this data captured in the near future through the regular EMIS data capture. It has however been reported that the number of primary and secondary schools with computers and internet access is limited. It is also worth noting that there is an operational computer studies curriculum “Teknolojia ya Habari na Mawasiliano” (TEHAMA) for primary school.

**ICTs in Secondary Schools**

The MoEV’T’s priority when it comes to deploying ICT has been Teachers’ Colleges followed by secondary schools. To this end, there have been disjointed initiatives aimed at the computerization of secondary schools in Tanzania in the last decade through different Development Partners, Private Sector and MoEV’T. Examples of these include, the e-Schools forum formed in 2005 which had proposed a phased approach for ICT in secondary schools, starting with 200 schools in phase 1, followed by a large scale roll out covering 2000 schools in phase 2 in a period of 5 years with a target of having all schools with ICT in 2015.

Another planned intervention is through the NoPC pilot project which targets the provision of ICT to 200 secondary schools which are close to TCs to improve the teaching of Math, Science and English. According to NoPC (UK), the NoPC solution transforms traditional computing, taking “thin” to a whole new level, greatly reducing the need for maintenance, support and upgrades. This solution has been said to be energy and cost-efficient PC substitution, eliminating high failure components, requiring little bandwidth and using under 100 watts for five workstations. With over 3,500 secondary schools in Tanzania, NoPC hoped to install computer systems in all of them providing Internet for over 1.2 million children to improve their academic experience. Other initiatives have been listed under the stakeholders section (5.4). It is hoped that the latest strategy under the TBT will centrally anchor all these and future ICT in education initiatives under the MoEV’T.

**ICT in Vocational Education**

The Vocational Education and Training Authority (VETA) owns 22 vocational training centers and coordinates over 900 other centers throughout the country. The other centers are owned by Non-Governmental Organizations, Government Agencies and individuals. It was reported that 15 of the 22 VETA centers and 190 non-VETA centers conduct computer courses. These courses range from basic ICT literacy to technical maintenance and support and network administration. According to information obtained during interviews, plans to build an ICT center of excellence by VETA in Dar Es Salaam are underway.

**ICT in Teacher Education**
ICT deployment in Tanzania was prioritized to start in the Teachers Colleges (TCs) followed by secondary schools and then primary schools. The implementation of ICTs in TCs was started in 2005 as a joint venture between MoEVT and the Swedish International Development Agency (Sida). The project’s main goal was to improve on the quality of pre-service and in-service teacher education by using ICT.

In the first phase of the deployment of ICT in TCs, all 34 Governmental colleges received 30 thin client computers and a server including peripherals and accessories, ICT training for education administrators, all tutors were trained in the use of ICT for teaching and learning which according to interviews translated to basic literacy skills. 2-4 tutors in each college were certified in CISCO IT essentials. A commercial ISP supplies the required bandwidth to all the colleges on contract basis. Tutors individually prepare e-content materials to enhance teaching. The funding for the teachers colleges is currently from the government through the recurrent budget allocation. 30 of these colleges are connected to the national electrical grid and 4 of the colleges use generators and solar panels. The project was completed in 2008 and has since become a program under the MoEVT. A five member team was formed to oversee the project after the completion of the project and withdrawal of Sida support. The table below outlines the ICT related activities and outputs under the Sida-MoEVT project.

Table 2: Activities vs. Outputs of the MoEVT/Sida project

<table>
<thead>
<tr>
<th>Activities</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Procurement and installation of hardware and software in all TCs</td>
<td>▪ Installation of 1,250 networked thin client computers in 34 colleges using open source</td>
</tr>
<tr>
<td>▪ All tutors to be trained in ICT basic literacy skills leading to ICDL certification</td>
<td>▪ Personal computers using MS software installed in seven zonal college laboratories for CISCO course</td>
</tr>
<tr>
<td>▪ One tutor in each college to be trained in computer installation, maintenance and repair services</td>
<td>▪ Internet connectivity using VSAT installed in all 34 Colleges</td>
</tr>
<tr>
<td>▪ Training in ICT for administration for principals, management and administrative staff</td>
<td>▪ Training of 80 tutor technicians</td>
</tr>
<tr>
<td>▪ Curriculum to be developed and used for ICT in Teacher Education</td>
<td>▪ Tutors with ICDL training in ICT integration skills have been trained in management skills and technical skills</td>
</tr>
</tbody>
</table>

Teacher Colleges, with their impressive infrastructure, were reported to be offering ICT training for trainees. Teacher educators have received training in the use of ICTs for teaching and learning but all accounts suggest that this training is focused on basic ICT skills.

There are also other initiatives to use ICTs for teacher training. For example, an ICT-based in-service teacher education project for secondary school teachers providing training on pedagogy and subject specialized education was developed by the Mid Sweden University (MiUn) which has a vast experience of distance education, flexible learning and teacher training and the MoEVT. The project is also supported by the Open University of Tanzania (OUT) and the University of Dar Es Salaam (UDSM). The overall purpose of the project was to enhance the performance of the secondary teachers by providing training on pedagogy and subject specialized education. The teachers will be trained through ICT-based short courses which will be tailored to the needs of teachers in particular subject areas.
Despite the government’s efforts to address the teacher shortage challenge, teacher demand remains high as opposed to supply. This calls for a need to explore alternative interventions to train more teachers and to keep those who are trained in the system. Further, there is a compounding challenge on the quality of teachers especially in the science subjects which are direly underserved in the secondary schools, teachers colleges, and in tertiary education. The fact that there are not enough qualified teachers in secondary schools means that the country is forever short of citizens who have the fundamentals of Science, Math and English. During the needs assessment, it was noted that the best place to start solving this problem is through ensuring that the teachers who go to the secondary schools are well equipped in the right knowledge, skills and attitudes so that they can groom a generation of students who have an interest and content knowledge in these subjects.

ICT in Higher Education

The higher education sector in Tanzania has taken and continues to take concrete steps to use ICT to address the main challenges that the sector faces. The sector is making investments in ICT, for example, it has been reported in a status report for higher education institutions in Tanzania (2008), that most universities have dedicated computer centers. Education and research networking activities are also beginning to take off and e-learning as a strategy to increase access is becoming central to many of the higher education institutions.

Findings indicate that the use of digital e-learning environments has not been widely adopted in most of the universities with the exception of the Open University of Tanzania and the University of Dar Es Salaam (UDSM). Although a number of universities offer general ICT Training for teachers and students, it was reported that it is only the UDSM that conducts research into the development of software for teaching and learning purposes.

The universities and other tertiary institutions have made significant investments in ICTs. All universities have computer centers available to the student population and many have high bandwidth connections through satellite (VSAT). A shared mechanism has been created for all Higher Education Institutions (HEIs) in the country to share information, systems, and knowledge. The arrival of submarine fiber to Tanzania and the installation of the national fiber backbone are expected to greatly benefit universities and other educational institutions, providing high speed internet connections for research and education.

Similar to the basic education sector, the higher education sector also faces the challenges of access, quality and relevance for which ICT could play an important role. ICT is also critical for research at this level.

ICT curriculum, content and training

Despite the low availability of ICT infrastructure in the basic education system, a curriculum for primary and pre-primary education, “Teknolojia ya Habari na Mawasiliano” (TEHAMA) is already in place. Information gathered during the needs assessment indicates that, ICT as a subject based on this curriculum is taught in only a few schools which are located near district headquarters and urban centers where infrastructural facilities are available. A secondary school ICT syllabus for Form I–IV exists, but it has not been implemented in many schools owing to a lack of ICT facilities and trained ICT teachers. The Tanzania Computer Literacy for Secondary schools Trust Fund (TCLSS) procures computers for secondary schools and helps them to set up computer laboratories. The project also teaches computer literacy and computer maintenance to students and teachers in schools. The project operates in about 20 schools within Dar Es Salaam and outside. Others also provide support such as the Best Education Trust Fund, the Tanzania Education Services Trust and
the Distance Learning Educational Services which provide on-line study notes and past examination papers.

Local content development has been found to be inadequate particularly as the need is for Kiswahili more than for English content. In his analysis of the challenges facing ICT4D in Tanzania, Yonazi (2009) notes that there has been progress in developing local content with the government and different sectors attempting to develop and provide citizen-focused content and services. This content is in the form of web portals, improved service delivery through the use of mobile technology through seamless integration and increased information sharing attitudes in the form of blogs, online forums and discussion groups.

**ICT and Education Policy Framework**

Tanzania has a fairly advanced policy framework for ICT and Education. The Ministry of Education and Vocational Training (MoEVT) Information & Communication Technology (ICT) Policy for Basic Education describes a vision for ICT in Education deriving from a number of national and international frameworks, policies and instruments, namely:

- The Tanzania Development Visions 2025 (2002)
- The Millennium Development Goals (MDGs)(2000)
- The Education Sector Development Program (ESDP) (2007 – 2011)
- The Primary Education Plan II (PEDP II) (2007 – 2011)
- The Secondary Education Department Plan (SEDP) (2010 – 2014)
- The Education Sector Review (2006)
- The Information & Communication Technology (ICT) Policy for Basic Education (2007)

“The Tanzania beyond Tomorrow (TBT)” is a new strategy in development under MoEVT that will define an E-Education Program for Basic Education for 2011-2020, and harmonize an ever expanding array of ICT in education initiatives. The TBT mission is to improve access, equity and quality in the delivery of basic education through integration of ICT in teaching and learning. The specific objectives of the TBT program are to:

- Identify all initiatives of ICT in basic education in order to harmonize and integrate them into a unified framework;
- Enhance the use of appropriate ICT in education
- Provide and/or improve appropriate ICT infrastructure to support teaching and learning in basic education;
- Provide capacity building for actors of the program;
- Transform basic education curricula for suitable e-delivery modes;
- Develop guidelines for e-education program;
- Integrate and use ICT in educational management functions that supports teaching and learning;
- Create partnership for ICT integration in Basic Education provision;
- Enhance integration of ICT in teaching and learning through research and development; and
• Mobilize financial, physical and human resources to support the development of ICT in basic education.

The Tanzania Development Vision 2025

• The Tanzania Development Vision 2025 envisages national development towards a society characterized by five main attributes: high quality livelihood; peace, stability and unity; good governance; a well-educated and learning society; and a strong and competitive economy capable of producing sustainable growth and shared profits.

• The Vision accords high priority to the education sector which is considered to be pivotal in bringing about social and economic transformation, as described in the following statement:

   Education should be treated as a strategic agent for mind-set transformation and for the creation of a well-educated nation, sufficiently equipped with the knowledge needed to competently and competitively solve the development challenges which face the nation. In this light, the education system should be restructured and transformed qualitatively with a focus on promoting creativity and problem solving (URT 2000:19).

• The Vision clarifies ‘the new opportunities that ICT is opening up’ as well as the need for development of ‘appropriate (ICT) skills and capabilities’ to meet the goals of the Vision. The demand is for ‘adequate investments to improve the quality of science-based education and to create a knowledge society generally’ (URT, 2002 p21).


• The National Strategy for Growth and Reduction of Poverty (NSCRP) (referred to by its Kiswahili acronym: MKUKUTA) identifies education as one of the priority sectors in Tanzania and recognizes ICT as a powerful developmental facilitator in the fight against poverty and in promoting sustainable socio-economic development.

• The NSGRP points to ICT ‘as a critical infrastructure that accelerates productivity in the productive and service sectors, in government, business, teaching and SMEs development’ (URT, 2005 p8).

• The long term impact of the strategy is to have an empowered citizenry being able to use ICT to the benefit of their income generating and private activities and being able to contribute to the achievement of a better life for themselves and their communities. The critical focus is to empower the poor, particularly those living in remote, rural and marginalized urban environments, to access information and to use ICTs as a tool to support their efforts to lift themselves out of poverty.

The Millennium Development Goals (MDGs)(2000)

Tanzania is committed to achieving the Millennium Development Goals (MDGs) for achieving the eradication of poverty. Of direct relevance to the Ministry of Education and Vocational Training (MoEVT) are the MDGs to achieve universal primary education and to promote gender equality. The government’s commitment is to use ICT as an important tool in assisting ministries in achieving each of the MDGs inclusive of those directly related to educational objective for improving access, equity and quality of provision (URT, 2007 p15).

The National Information and Communication Technologies (ICT) Policy, 2003
• Through its ICT Policy Task Force and a national e-think tank, the Government of Tanzania produced an ICT policy document that was presented and debated by key stakeholders in May 2002. Subsequently, the Cabinet approved the first National Information and Communication Technologies Policy in March 2003. The goals focus on 10 areas, which include strategic ICT leadership, ICT infrastructure, ICT industry, human capital, legal and regulatory framework, productive sectors, service sectors, public service, local content and universal access.

• The policy recognizes the strategic input that ICT can have in the education sector. The policy describes the ICT potential as providing new opportunities ‘to enhance education, including curriculum development, teaching methodologies, simulation laboratories, life-long learning and distance education and for teaching of not only ICT, but of all subjects and specializations’ (URT 2003, p13).

• The policy calls for the development of a nationwide e-education system, the teaching of ICT at all levels of education and training and the use of ICT to improve the quality of delivery of education. The policy recognizes challenges in education systems for developing appropriate attitudes, knowledge and skills to support ICT initiatives and programs (ibid., p14).

The Education and Training Policy (ETP)(1995)

• The Tanzanian Education and Training Policy (TEPT) was developed in 1995 as a result of recommendations from report submissions to the government on the Tanzania Education System for the 21st Century (1991). The TEPT emphasizes the teaching of Mathematics, Science and Technical subjects inclusive of computer subjects to promote Science and Technology (S&T) development. The policy advocates the teaching of S&T to permeate across all subjects areas in the school curriculum.

• The policy highlights the need for coordination of Science and Technology integration in Education and Training via intra, inter and extra ministerial cooperation. The National Commission of Science and Technology (COSTECH) was established to promote and coordinate S&T as essential components of education and training across the system (URT 1995, p53).

The Education Sector Development Program (ESDP) (2007 – 2011)

The Educations Sector Development Program (ESDP) for the reform and development of education in Tanzania include the following two major programs in Basic Education:

The Primary Education Plan II (PEDP II) (2007 – 2011)

• The Primary Education aims at offering Universal Primary Education for all children between the ages of 7 – 13 years.

• The plan focuses on seven strategic components at primary sub-sector namely; enrolment expansion with a focus on ensuring access and equity; quality improvement; strengthening capacities; addressing the cross cutting issues; strengthening institutional arrangements; undertaking educational research; and conducting educational Monitoring and Evaluation (URT, 2006 p1).

The Secondary Education Department Plan II (SEDP II) (2010 - 2014)
• The Secondary Education Plan II builds on national and international reforms regarding the education sector.

• The plan focuses on five areas of national goals for secondary education provision namely: improving the quality and relevance of secondary education provision; enhancement of access and equity; improvement of the teaching force and teaching process; improvement of management efficiency and good governance; institutionalization of cross-cutting issues (URT, 2010b pviii).

References to ICTs are prominent in both the PEDP II and SEDP II. The emphasis in both documents is on the need for access to and improved quality of education despite system expansion and increasing numbers of enrolments. Teacher education programs are striving to accommodate the rising demand for more qualified teachers as well as the changing role of teachers into facilitators of learning and problem solving. A major area of reform taking place through PEDP and ESDP is teacher development. The need is for a shift from teacher-centric knowledge transmission approaches with a heavy dependence on text-based static media to exploring alternative student centered approaches for knowledge building and construction that is supported by the integration of electronic-based dynamic multi-media. The use of ICT-mediated training and distance education has been identified as one of the key strategies for access and quality improvement. Both the PEDP and SEDP prioritize ICT-based information management at all levels and the introduction of computer courses into primary and secondary education (URT, 2007 p17).

The Education Sector Review (2006)

The Tanzania Education Sector Review of 2006 reiterates parameters defined in the National Vision, the poverty reduction strategy and the education and ICT policies for the expansion of ICT use to improve the quality in education and training, as in:

• The improvement of school facilities and teaching and learning materials in relation to text-based and electronic materials
• The harmonization of MIS systems in the education sector
• The integration EMIS at different system levels to produce and manage educational data and information (MoEVT, 2007 p17; Hare, 2007 p7)


Tanzania is a signatory to the WSIS Declaration of Principles and Action Plan, the aim of which is to build a people-centered, inclusive and development-oriented Information Society; to put the potential of knowledge and ICTs at the service of development; to promote the use of information and knowledge for the achievement of internationally agreed development goals, including those contained in the Millennium Declaration; and to address new challenges of the Information Society, at the national, regional and international levels (WSIS, 2003; 2005 p1-2).

WSIS targets for education to be achieved by 2015 include targets:

• to connect universities, colleges, secondary schools and primary schools with ICTs;
• to adapt all primary and secondary school curricula to meet the challenges of the Information
• to ensure that ICTs are fully integrated in education and training at all levels, including in curriculum development, teachers training, institutional administration and management, and in support of the concept of lifelong learning (WSIS 2003; 2005; cited in MoEVT 2007 p17)

The Information & Communication Technology (ICT) Policy for Basic Education (2007)
Recognizing the potential of ICT as a significant tool for improving education delivery, outcomes and impact, the MoEVT embarked on the development of an ICT Policy for Education in 2006. A multi-stakeholder consultation process for providing policy advice on technology integration resulted in an ICT guideline (also referred to as ‘White Paper’) called ‘Thinking through the use of ICT in Secondary Education in Tanzania - Deliberations of a multi stakeholder work group on education’ which was submitted to the MoEVT in 2006. The paper provided input to the development of the national ICT Policy for Education that the MoEVT launched in 2007. The national policy document entitled the Policy for Information and Communication Technology (ICT) for Basic Education presents guidelines for system wide ICT integration in basic education covering pre-primary, primary, secondary and teacher education as well as non-formal, adult education and university education. The policy considers issues of infrastructure; curriculum and content; training and capacity development; planning procurement and administration; management, support and sustainability and monitoring and evaluation. It defines a broad vision and mission for ICT integration in Education ‘to enhance access, equity, quality and relevance of basic education, while stimulating and improving teaching and life-long learning’ (MoEVT, 2007 p5).

The policy objectives are to:

- Integrate the use of ICT to achieve Education policy objectives;
- Promote the harmonization of activities, approaches and standards in the educational uses of ICT;
- Ensure that there exists equitable access to ICT resources by students, teachers and administrators in all regions and types of educational institutions and offices;
- Ensure the proper management and maintenance of ICT resources and tools;
- Ensure the organized provision of ICT training to students, teachers and educational administrators;
- Facilitate the implementation of communication and information systems for the effective management of the Education Sector;
- Facilitate the use of ICT as a tool for assessment and evaluation of education, as well as administration and management;
- Encourage partnerships between the various stakeholders in the Education Sector;
- Facilitate the use of ICT resources in schools and colleges by the neighboring community;
- Facilitate the development and use of ICT as a pedagogical tool for teaching and learning, and for professional development of teachers, administrators and managers;
- Promote development of local content for basic education and other stakeholders

In order to implement the ICT in Basic Education agenda the policy guidelines stipulate the following modalities:

- Publication of the ICT policy using a variety of media for dissemination to all stakeholders
- Establishment of an ICT4E Unit and a network of ICT4E Focal Persons in all MoEVT Departments
- Preparation and Implementation of Action Plans by the ICT4E unit
- Establishment of a Steering Committee with representation of key stakeholders, partners and Ministry representatives to advise the ICT4E unit
- Policy implementation via a partnership approach
- Use of good practice models to inform and foster ICT implementation success
- Alignment of ICT policy implementation to all relevant national and sectoral programs in Tanzania


The *Framework for ICT use in Teacher Professional Development in Tanzania* elaborates on a development path outlining the vision, goals, resource requirements and expected outcomes for ICT integration in teacher development - with a particular focus on the challenges to be addressed over the short term. The framework objectives were developed to address the challenges of teacher shortages, teacher quality and teacher support in the short term, but also over the medium and long term to address requirements for:

- Equipping educators through pre-service and in-service training programs with the required competencies (knowledge, skills and attitudes) to effectively use the available ICT infrastructure in the TCs to address the educational challenges related to access, quality, equity and relevance over the longer term
- Using the existing ICT infrastructure and capacities to address teacher shortages particularly in core subjects and to upgrade the qualifications of licensed teachers
- Developing competent tutors and teachers who will confidently integrate ICTs as pedagogical tools and educational resources to implement the curriculum effectively and to facilitate active student learning
- Developing the required e-resources to be used through both online and offline networks
- Developing tutors, teachers and trainee teachers who are committed to life-long learning using the opportunities afforded by ICTs to grow professionally
- Providing a well-equipped and effectively managed environment for teaching and learning using ICTs.
- Developing networks for learning (communities of practice) for sharing knowledge and developing good practices for ICT use in teaching and learning

Mapping Stakeholders in ICT and Education in Teacher Development

The mandate and ICT related objectives of those involved in Education and Teacher Development in Tanzania are briefly outlined below. These are grouped under three categories: (1) Government Ministries and Agencies (2) International Development Partners and (3) Private Sector and Civil Society organizations.

**Government Ministries and Agencies**
Ministry of Education and Vocational Training

The Ministry of Education and Vocational Training (MoEVT) is responsible for the education sector. It is headed by a Minister and Deputy Minister, a Permanent Secretary and Deputy PS, a Commissioner for Education and Directors in charge of Primary Education, Secondary Education, Teacher Education, Policy and Planning, School Inspection, Administration and Human Resource, Technical Education and Higher Education. The MoEVT includes a number of semi-autonomous agencies: Agency for Development of Education Management (adem), Institute of Adult Education (IAE), National Examinations Council of Tanzania (NECTA), Tanzania Institute of Education (TIE), Tanzania Libraries Services Board (TLSB) and Vocational Education and Training Authority (VETA) and the Tanzania Education Authority (TEA).

Teacher Education and Universities are under MoEVT. The PMORALG is also involved in the posting of teachers to the various schools. The remuneration of teachers is under the Ministry of Finance alongside all other civil servants.

A Regional Education Officer coordinates all regional education matters. A District/Municipal Education Officer heads the District/Municipal education office. Whereas the Ministry has overall responsibility for running the education system, each district/municipal office is responsible for school buildings in its area as well as for the supply of equipment and materials to the schools. The Ministry has a national inspectorate whose task is to conduct a full inspection of each school in the country once every two years. Each district office also has a team of school inspectors whose task is to visit each school in the district at least twice a year and to advise and help all teachers with their teaching. There are no regional school inspectors but rather zonal school inspectors who mainly visit secondary schools, and teacher colleges.

Prime Ministers’ Office Regional Administration and Local Government (PMO-RALG)

Whereas the Ministry of Education and Vocational Training (MoEVT) is responsible for policy formulation, planning, co-ordination, monitoring and evaluation of programs and activities, the day-to-day management of primary and secondary schools is under the PMO-RALG. PMO-RALG operates at the regional level through its Regional Secretariat and Local Government Authorities (LGAs) and it is the implementing Ministry in the decentralized structure of education.

Ministry of Finance

The Ministry of Finance pays teacher alongside all other civil servants. The skills and competencies of teachers need recognition and incentives should be provided if there is going to be progress and implementation of the contextualized standards.
Teacher Education Department (TED)

The mandate of the Teacher Education Department (TED) is the recruitment of teacher trainees, for primary and secondary and pre-primary, teacher education curriculum, building capacity and teacher educators, and college principals. The main role of the department is curriculum in teacher education with a goal of equipping them with skills to teach in secondary schools.

Secondary Education Department (SED)

The Mandate of the Secondary Education Department (SED) at the Ministry level is policy, program management and design, and quality assurance of secondary education. Secondary schools administration was moved to local government through decentralization. Secondary schools focused on the day-to-day running matters of educational delivery covering employment of teachers, student management and welfare in relation to transfer of students and teachers.

School Inspectorate Department

The School Inspectorate Department functions under MoEVT and is comprised of four sections for educational management, secondary education, basic education and teacher education. Its mandate includes: school inspection with a goal for providing advice to the commissioner for better decision making and planning; inspection, training and advice to school managers, school boards and teachers on good pedagogical practice and implementation of school development plans; improvement of teaching standards in schools; in-service training of teachers; and supervisory visits to improve the quality of teaching in schools.

Agency for Development of Education Management (ADEM)

The Agency for the Development of Educational Management (ADEM) was established by the Executive Agency Act of 1997 in order to provide regular and systematized educational management and administration training for all categories of educational management and administration personnel in the education service.

The Institute's major function is to strengthen the capacity and capability of all serving and future educational managers and administrators who would qualitatively improve the efficiency and effectiveness of the educational institutions in the system. The mission of ADEM is to promote qualitative and quantitative improvement of the Education system through training, research and consultancy in Educational Management and Administration and hence to produce both effective and efficient professional educational managers and administrators.

ADEM focuses on providing professional long courses that lead to the award of management certificates, ordinary diplomas to relevant trainees in the field of educational management and provision of in-service short management courses to educational administrators such as school/college heads.

Education Management Information System (EMIS) Development Plan

The Education Management Information System (EMIS) Development Plan under MoEVT aims at developing capacities in the Ministry of Education to make it more efficient in executing its core functions of policy formulation, monitoring and evaluation, standards setting, providing regulatory frameworks, co-ordination and optimization of resource use through improved access to and use of
EMIS at all levels of education. EMIS is currently being used to collect process and disseminate education data to educational institutions on a timely basis.

At the time of writing this report, it was reported that all regional and district offices had been provided with computers and printers. Training of the regional, district, statistical and logistics officers was also reported to be complete. Inspectorate offices at the zonal and district levels had been provided with computers and printers. The result of all these efforts was the timely and periodical production, management and dissemination of educational data and information to educational stakeholders through a publication known as Basic Education Statistics in Tanzania (BEST).

**Tanzania Education Authority (TEA)**

TEA consists of a Board and team of management. The Tanzania Education Authority is mandated with the management of the Education Fund and is charged with responsibilities of:

- Securing funds to finance education
- Advising the government on new sources of revenue to ensure adequate and stable flow of funds
- Promoting improvement of the quality of education
- Applying monies deposited to the fund for purposes of improvement and promotion of education
- Monitoring use of funds disbursed and ensuring adherence to the fund objectives
- Receiving gifts, donations, grants, bequests or any other forms of contributions on behalf of the education fund.

TEA supports the improvement of the quality of education through the provision of text books, soliciting funds for education, and the provision of ICTs to schools. The priority areas include secondary education, VET centres, TCs and universities. The institutions are required to write proposals to TEA requesting for the above services. TEA is financed by the government, stakeholders and development partners. TEA also provides support in the provision of science laboratory equipment to the stated institutions.

TEA has facilitated the distribution of 20 computers to each of the following category of institutions:

- 12 private universities
- 18 technical training institutes
- 19 private secondary schools
- 20 public secondary schools
- 10 public universities

Challenges registered by TEA include:

- High demand for all the resources listed above which exceeds supply.
- Technical maintenance of the computers provided in the schools especially in the rural areas.
- Lack of coordination in the distribution of the ICT equipment by the various implementing partners

**Tanzania Institute of Education (TIE)**

The Tanzania Institute of Education (TIE) is a Parastatal Organization under the Ministry of Education and Vocational Training (MOEVT) charged with the responsibility of ensuring the quality of education in Tanzania at the pre-school, primary, secondary, and teacher training levels. This it does through
the development of the required curricula at each of these levels. TIE’s achievements in ICT and Education include:

- Development of ICT syllabus for primary education
- Development of ICT syllabus for secondary education
- Development of syllabus for teacher education at certificate and diploma levels
- Establishment of a recording studio for e-content development
- Establishment of a mini theatre for education related activities
- Currently preparing a proposal for e-Learning under teacher professional development
- Development of an ICT policy and masterplan for TIE

Challenges that have been registred by TIE include:

- Lack of expertise in teaching of ICT and integration of ITCs in schools
- Infrastructure and equipment for TIE and the personnel
- Low bandwidth resulting in slow connectivity speeds
- Lack of awareness on the benefits of ITCs in Education
- Fragmented understanding of e-Learning and its benefits.

**National Examination Council of Tanzania (NECTA)**

The National Examination Council of Tanzania (NECTA) is responsible for the administration of all national examinations in Tanzania, and awards official diplomas in primary, secondary and post-secondary education. The exponential growth of the number of students and candidates has led to an increased need for online registration for examinations. Online registration is facilitated through regional offices in the rural areas where infrastructure and connectivity remain a challenge. It was reported that plans are underway for registration to be taking place through the postal corporation offices to enable the registration of students in the interior parts of the country. Another way in which ICT is being used in examinations includes marking with the optical reader technology for primary certification on a pilot basis and releasing of results through the internet.

The recent change to the competency-based curriculum has necessitated a change to competency-based assessments which as meant that there is now a change in the evaluation process. This calls for teachers to evaluate the students at school level. This has been challenging due to the competence of the teachers as teachers tend to award students very high marks.

NECTA is also involved in the analysis of students’ performance each year on a per subject basis in the various levels of education. Reports indicate that there has been a consistent decline in the performance of the science subjects as shown in Appendix 1 resulting in a vacuum of scientists in the country as a whole due to a lack of basic fundamentals in the science subjects.

**Vocational Education Training Agency (VETA)**

VETA was established as an autonomous government agency charged with the overall responsibility of coordinating, regulating, financing, providing and promoting vocational education and training. As a regulator, VETA coordinates and supports VET provision to ensure that the training provided is of the required quality and meets the demand of the labor market. VETA therefore develops curricula, occupational unit standards, Training and Learning Elements, and conducts examinations and certification for the vocational training centers.

The Authority coordinates more than 900 vocational training centers in the country, providing training in more than 90 different long course skills and various tailor made short courses. VETA also
conducts Labor Market Surveys to determine demand for training. These findings from the surveys are used in revising and upgrading the curricula for vocational training centers.

VETA owns 22 vocational training centres distributed in 20 political regions of Tanzania mainland. In addition there are more than 840 vocational education institutions which are non-VETA owned.

Open University of Tanzania (OUT)

The Open University of Tanzania, which plays a major role in the in-service training of teachers, is a fully fledged and accredited public institution of higher learning autonomous and mandated to conduct academic programs leading to certificate, diplomas, undergraduate and postgraduate qualifications. OUT has a Learning Management System (OUTLeMS) -platform which enables access to the various courses offered by the Open University. Registered students gain access to the study materials and other relevant course content. OUTLeMS also facilitates communications between students and their respective teachers. At the time of writing this report there was a pilot project underway for delivery of courses by use of mobile phones in remote and isolated areas. In the in-servicing of teachers OUT has been involved in:

- Enhancing the performance of the secondary teachers by providing training on pedagogy and subject specialized education; and
- Training teachers through ICT-based short courses which are tailored to the needs of teachers in particular subject areas.

OUT stands out as one of the partners in the TDEV21 project because of its role in the in-serving of teachers who are already in the field. One of the biggest challenges contributing to teachers’ shortage in secondary schools was identified as the migration of teachers to institutions of higher learning to further their education. OUT is one of the institutions that has the required machinery to arrest this situation. In addition, while in-servicing teachers OUT would on one hand greatly benefit from the identification of the ICT competencies for teachers in secondary school and become one of the implementing institutions. On the other hand TDEV21 would greatly benefit from the contribution of experiences that OUT would bring to the TDEV21 project.

International Development Partners

Swedish International Development Agency (Sida)

Sida has been working in Tanzania in Teacher education for more than three decades. In 2005, the MoEVT with support from Sida initiated a program for introducing ICTs in teacher’s colleges. The program was aimed at improving the quality of teacher education in both pre-service and in-service education. The project involved installation of thin client computers with a server and internet connectivity in all the 34 teachers colleges. “This project was completed in 2008 after which it became a program under the MoEVT. Morogoro Teachers College was nominated as the lead college to oversee the continuation of the program under the Teacher Education department in

Sida and the MoEVT approached GESCI in September 2009 to facilitate the development of an ICT TPD Framework which would serve as a roadmap to integrate ICT into the teacher education system using the existing ICT infrastructure at TCs. This resulted in A Framework for ICT Use in Teacher Professional Development in Tanzania (2009). This has since been followed by a project under development for improving math, science and English in secondary schools which will be implemented between 2011 and 2013 which is still under Sida funding.
World Bank

The World Bank is currently involved in the implementation of the Secondary Education Development Plan II (SEDP II). SEDP II is a follow-up to SEDP I which was completed in 2008. SEDP II will be implemented between 2010 and 2015 and has 4 components. These include upgrading existing schools infrastructure; improving equitable provision of teachers and the quality of teaching in mathematics, sciences, and languages; ensuring adequate financing to secondary schools and improving utilization of resources and; providing capacity building and technical assistance to implement reforms to strengthen institutional capacity for educational management.

Global eSchools and Communities Initiative (GESCI)

The Global e-Schools and Communities Initiative (GESCI) is a global organization offering strategic advice to the education and training sector (primarily Ministries of Education) in developing countries on the effective use of ICTs for Education.

In 2009 GESCI undertook a situational needs analysis to scan the ICT in Education landscape in Tanzania and to develop a general understanding of the main education issues, determine the country’s interest, identify key challenges and opportunities for using ICT in Education (Swarts and Wachira, 2010).

Following dissemination of the needs analysis report, Sida and the MoEVT approached GESCI in September 2009 to assist the MoEVT in facilitating the development of an ICT TPD Framework which would serve as a roadmap to integrate ICT into the teacher education system using the existing ICT infrastructure at TCs. This resulted in the development of A Framework for ICT Use in Teacher Professional Development in Tanzania (2009).

Bridge IT project

In 2007 the MoEVT and the International Youth Foundation (IYF) launched Bridge IT Tanzania in close partnership with the Forum for African Women Educationalists (FAWE), Nokia, Nokia Siemens Networks, Pearson Foundation and Vodacom Foundation. Bridge-IT’s goal is to significantly increase the quality of teacher instruction and achievement among primary school students in standards 5 and 6 in math, science and life skills through the innovative use of cell phone and digital technology. The program operates in 150 schools, has reached 20,619 students, trained 1,204 teachers, and developed and distributed 96 videos and 102 learner-centered lesson plans to each school in 2009.2 The project is about the use of mobile phones to teach Math and Science in class 5 and 6, development of course materials by Pearson Foundation, hosting of the course materials by Vodacom, delivery of the course materials through Nokia phones to the schools and in the classrooms, and use of the content by teachers in the classrooms.

Canadian International Development Agency (CIDA)

The education for empowerment (EFE) project under the funding of CIDA will run from 2009 to 2012 in 12 VETA Institutions. EFE aims at training trainers for the technical and vocational sectors of education.

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2 IYF. Elimu kwa Teknologa
This is a joint project between the British Council, Rotary Club of the UK and TEA. The goal is to have 700 computers distributed in 35 secondary schools, two teachers trained per school in basic technical maintenance skills and collaboratively develop content with teachers between the 35 schools Tanzania and the UK.

**Private and Civil society organizations**

**Education and Research Networking**

Tanzania Education and Research Network (TERNET) is the National Education and Research Network (NREN) for Tanzania. The Tanzania Education Network’s (TERNET) vision is to provide an electronic network that will connect all Higher Education Institutions in the country as well as research facilities and teacher colleges. Specifically, TERNET aims at providing network infrastructure that facilitates Education Management Information Systems (EMIS) support for e-libraries and electronic information access, research databases, and enhancement of e-learning capacity. Most of the initiatives in TERNET are at the nascent stages. Plans to facilitate these existing efforts and initiate joint programs that will be set up to make e-learning resources for teachers and students in Higher Education Institutions are under way.

TERNET funding is dependent on volunteered contributions from member institutions which makes it challenging. While VSAT has provided high bandwidth internet for many higher education institutions, e.g. UDSM, Sokone University of Agriculture and Muhimbili Medical School, it is hoped that TERNET will take full advantage of the national backbone that is currently being laid to realize its mandate and objectives.

**ICT-based In-Service Teacher Education for Secondary School Teachers in Tanzania**

This was a partnership between SPIDER, MoEVT, Open University, Tanzania, Mid Sweden University, and University of Dar Es Salaam. The activities that were projected under this project include:

- Equip teachers with basic ICT skills to be able to benefit from the potential of ICT in teaching and learning.
- Develop models for communication and distribution of learning material for different technical environments (broadband, VSAT, mobile phones, CD/DVD, memory cards etc).
- Support teachers to handle the challenges of using e-resources through knowledge sharing, networking and collaboration for improving teaching.
- Promote equitable access to educational resources through the strategic application of ICT.
- Exploit the interactive potential of ICT in the provision of modern education theory and practice via distance education programs.
- Create strategic partnerships for a sustainable ICT program through collaboration with the public, private and community sectors.
- Establish a school network system for the collaborative sharing of educational resources and stakeholder participation.
- Encourage head teachers, teachers and students to be involved in the development of applications and to use ICT meaningfully to enhance the teaching-learning process.
- Encourage and facilitate the use of the Internet as a research and communication tool among students, parents, teachers, principals, other MoEVT officials and members of the community.
Barclays Bank

This is an East African (Tanzania, Uganda, Kenya) project supporting secondary schools with refurbished computers. The implementing partners include Barclays Bank, Commission for Science and Technology (COSTECH), Tanzania Education Authority (TEA) and Mkombozi Children’s Home. 100 computers distributed in 5 schools in Tanzania by end of 2009.

Tanzania Education Services (TanEdu)

This is a project under the Dutch government funding there the goal is to:
- Create a knowledge society by providing educational information and services to the public through the most efficient means.
- Through the TanEdu website that provides information on schools and colleges in Tanzania, gives access to meaningful, practical, and useful educational resources.

TanEdu prides itself in having achieved the following:
- Raising awareness on HIV/AIDS through multimedia tools
- Providing the latest news on the education sector and is a platform for information exchange
- Produces a newsletter that is distributed in rural areas for purposes of raising awareness on the benefits of ICT.
- Reaching more than 100,000 students, 1000 teachers, 1500 principals, 1000 parents, 100 researchers.

Bright Education Trust Fund

This project is focused on providing training for teachers and school administrators by teaching them how to use ICT for classroom teaching and administrative procedures through working with teams of teachers per school. It has been operating in a few schools in Dar Es Salaam.

Distance Learning Education Services (DILES)

This is an IICD supported program which has been involved in the provision of distance learning tools and services, teaching and learning materials for secondary schools, revision materials, past national examinations paper questions and suggested answers in printed and electronic form. Where possible, the internet and multimedia facilities are taken advantage of. DILES provides example of how to use ICT to benefit schools located in remote and disadvantaged areas. This was reported to be working in 508 rural schools and 78 schools in the city.

Tanzania Computer Literacy for Secondary Schools (TCLSS)

TCLSS has been operating successfully in 20 schools within Dar Es Salaam and its environs through Cost sharing in operational costs with parents and schools. It has been involved in procurement of computers for secondary schools, setting up of computer laboratories, and teaching computer literacy, computer maintenance to students and teachers.
Stakeholder Analysis

The rationale for stakeholder analysis is based on the findings presented in the previous chapter on the need to focus the TDev21 intervention at secondary and teacher education levels. Table 5 provides an overview of the effects of a pilot intervention on stakeholder interests and potential influence for advancing the ICT competency standards for teachers in Secondary and Teacher Education in Tanzania.

Table 3: Stakeholder Analysis of the Key National Counterparts of the TDEV21 Pilot Project

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Interests</th>
<th>Effects of pilot intervention on stakeholder interests (High. Medium, Low)</th>
<th>Influence</th>
</tr>
</thead>
</table>
| Ministry of Education and Vocational Training | Policy and framework formulation  
Standards setting in the entire education system. | The TDEV21 pilot project is timely  
The MoEVT is currently implementing the Secondary Education Development Program (SEDP II) which is addressing challenging issues in secondary education among which there are the dual challenges of supply and quality of teachers and teaching in Science, Mathematics and English as a priority. | High |
| Prime Ministers' Office Regional Administration and Local Government (PMO-RALG) | Management of education institutions under the decentralized structure of administration  
Local government Authorities are involved in the construction of facilities in secondary schools and have a direct influence on the day-to-day running of the institutions. | Identification of institutions to be involved in the project and implementation of the competencies | Medium |
| Ministry of Finance | Provision of incentives to teachers who have acquired certain levels of certification and competencies | TDEV21 project would provide a yardstick that could be used to reward and recognize teachers who have attained certain competencies. | Medium |
| Teacher Education Department | Teacher Education curriculum  
Building capacity of teacher educators, and college principals.  
Equipping teachers with skills to teach in secondary schools. | The TDEV21 project will strengthen and complement the ICT initiatives in the department  
It will provide competencies against which TED can measure teachers progress in the acquisition of ICT skills and integration in teaching and learning | High |
<p>| Teachers' Colleges | Offer courses leading to a certification in teacher | All the Teachers colleges are computerized and are already | High |</p>
<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Interests</th>
<th>Effects of pilot intervention on stakeholder interests (High, Medium, Low)</th>
<th>Influence</th>
</tr>
</thead>
</table>
| Agency for Development of Education Management                                | education or diploma in teacher education and they are posted to primary and secondary schools | implementing the Computer studies curriculum  
- There is an urgent need to utilize the existing infrastructure for more than the acquisition of basic ICT skills  
- Teachers colleges are ready for the development of ICT competencies for integrating  
- ICT in the teaching and learning process. | Medium                                                                                                                                                                                                                                                                                                                                                                                                 |           |
| Secondary Education Department (SED)                                          | Provide regular and systematized educational management  
- Conduct administration training for all categories of educational management and administration personnel in the education service. | The TDEV21 intervention would support and contribute to whole school planning process especially because policy and organizational management were among the priority areas in the Training Needs Assessment  
- Piloting the competencies via the revised curriculum would have a wide influence to reach several levels of education under the Teacher Education Department’s mandate  
- The thrust in the pilot phase is moving towards Basic Education on the basis of access, equity and quality focus in the national agenda | High      |
| Schools Inspectorate Department                                               | Secondary education and teacher education  
- In-service training of teachers  
- Program management and design, and quality assurance of secondary education | The project would have a positive effect on SED interests as it offers an opportunity to pilot standards with practicing teachers.  
- It also would provide an opportunity to benchmark the standards for a continuum of professional development from pre-service to in-service  
- It also provides a good avenue for scaling up and hence sustainability | Medium    |
<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Interests</th>
<th>Effects of pilot intervention on stakeholder interests (High, Medium, Low)</th>
<th>Influence</th>
</tr>
</thead>
</table>
| Vocational Education Training Authority (VETA)   | ▪ VETA coordinates and supports VET provision to ensure that the training provided is of the required quality and meets the demand of the labor market.  
▪ VETA develops curricula, occupational unit standards, Training and Learning Elements, and conducts examinations and certification for the vocational training centers.                                                                                                                                                                                                                                                                                                                                                   | ▪ The TDEV21 pilot project can bring in a broad set of standards and a continuum of ICT integration approaches for VET teachers  
▪ The scope of the project may not be sufficient in the pilot phase to develop two sets of standards for mainstream education and Vocational Education                                                                                                                                                                                                                                                                  | Medium     |
| Department of Higher Education                    | ▪ Regulation of higher education                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | ▪ Graduates from universities are posted to secondary schools and teachers colleges  
▪ The scope of the pilot project will not provide sufficient parameters for engagement with the department of higher Education                                                                                                                                                                                                                                                                                                                                 | Low        |
| Open University of Tanzania (OUT)                 | ▪ Providing wider access to teacher education  
▪ Focusing on flexible and qualitative provision  
▪ Integrating information technology media in the provision  
▪ Establishing a network of study centers across the country  
▪ Expertise in the development of online materials for teacher education  
▪ Expertise in supporting online learners (including in teacher education)                                                                                                                                                                                                                                                                                                                                                                                              | ▪ Using ICT in the in-servicing of teachers through Open and Distance education methods  
▪ Integrating ICT in the provision of its courses  
▪ Developing ICT materials for instruction that will be used online  
▪ Ensure a higher level of retention of teachers in secondary schools  
▪ Implement competency standards for teachers during in-service training.                                                                                                                                                                                                                                                                                                                                                                    | Medium     |
Conclusions from landscape and needs analysis

A. There is a strong policy and programmatic focus at national level on ICT and Education

- The National ICT policy describes a continuum approach for developing technology competencies from teachers: from basic literacy skills to ICT use in management and administration to content development and the pedagogical integration of ICT in practice. ICT should be used as a tool to facilitate learning. Newly graduated teachers should be able to design and present their lessons using ICT. Practicing teachers should also be able to use ICT equipment for lesson preparation. All teachers should be able to move to other levels of ICT utilization beyond technology literacy levels.

- The Primary Education Development Program (PEDP), Secondary Education Development Program (SEDP), Complementary Basic Education in Tanzania (COBET), Integrated Community Basic Adult Education (ICBAE) and the National Higher Education Policy are the major programs undertaken by the Ministry of Education and Vocational Training to operationalize the national education policy.

- The ICT Policy for Basic Education presents an approach that raises the bar on the model for ICT integration in the Education system. It is an approach that moves beyond technology literacy towards knowledge-based (knowledge deepening & knowledge construction) approaches for ICT integration. It is an approach that is focused on educational transformation - to make educational provision more relevant and responsive to national development needs for producing technologically literate citizens who can boost the economic engine and contribute to a learning knowledge society.

- The Tanzania beyond Tomorrow’ (TBT) is a new strategy in development under MoEVT that will define an E-Education Program for Basic Education for 2011-2020. Identify all initiatives of ICT in basic education in order to harmonize them, enhance the use of ICTs in education, and improve ICT infrastructure to support teaching and learning in basic education.

B. The proposed intervention can compliment ongoing effort to shift education from a content-based to competency-based

- The entire curriculum at every system level has been reviewed and revised to move from teacher-directed content based to learner-centered competency based delivery. The ICT policy outlines a framework for ICT integration in the revised curriculum as a subject and as a pedagogical tool for teaching and learning across all subject areas. The shift in the curriculum from a content-based to a competency-based approach redefining the role of the teacher as facilitator forms an integral part of the agenda for ICT integration to facilitate student centered and discovery learning approaches.

- The proposed initiative can serve as an opportunity to link the contextualization of the ICT-Competency Standards for Teachers in Tanzania to the national policy vision for moving teachers from ‘technology literacy’ to ‘knowledge-based’ approaches. This would in turn support national education objectives for moving teachers from ‘knowledge gatekeepers’ to ‘knowledge facilitators’. It would also provide a yardstick that can be used to measure the progression of teachers from one level of competency application to the next.
C. The intervention compliments ongoing work on building capacity on teacher development preservice and in-service

- The Teachers Colleges are already equipped with basic ICT infrastructure, have a curriculum in place and 95% of their tutors have undergone technology literacy capacity building programs. The infrastructure comprises of 30 thin client computers and a server including peripherals and accessories in all the 34 colleges. A commercial ISP supplies the required bandwidth to all the colleges on contract basis. 30 of these colleges are connected to the national electrical grid and 4 of the colleges use generators and solar panels. Capacity building included basic ICT training for education administrators, training of all tutors in the use of ICT for teaching and learning which according to interviews translated to basic literacy skills. In the first phase of the deployment of ICT in TCs, 2-4 tutors in each college were certified in CISCO IT essentials. Previous attempts to have the infrastructure used for curriculum delivery fell short of the mark because it was not clear what it was that teachers were expected to know and be able to do in as far as the use of ICTs for classroom practice goes. TDEV21 presents a good opportunity to bring this value add.

- Recognizing that teachers need systematic competency development, in 2009, the government developed the “Framework for ICT use in Teacher Professional Development” elaborating a development path with vision, goals, resource requirements and outcomes for ICT integration in teacher development.

- The dual challenges of school expansion and acute teacher shortages have placed new demands on teacher colleges. Government estimates a requirement of 45,000 additional teachers to meet demand resulting from the exponential growth in student populations from primary to secondary level. College capacity to meet teacher demand is inadequate with high attrition rates exacerbating the problem particularly in rural zones. Colleges are attempting to address shortages and stem the tide of attrition by exploring the use of technology for providing in-service and distance education programs.

- The project pilot presents an opportunity to build capacity in colleges for enhancing outreach programs to support school communities in practice-based on-going professional development for technology use within the resources and constraints afforded by real classroom contexts.

Implications for TDev21 pilot design

- There is the opportunity to focus the TDev21 project on the pre-service and in-service training of secondary school teachers – situating the project in Teacher Colleges (TCs) (pre-service) and a sample of secondary schools (in-service) and zones linked to the TCs. The project pilot would be conducted under the leadership of the Teacher Education Department supported by Secondary Education Department with built-in mechanisms for sustainability from the onset.

- TDEV21 should be anchored in the Ministry of Education and Vocational Training with the involvement of the following Departments and Ministries for strategic reasons:

  o The Teacher Education Department at the Ministry of Education should be involved as the overseer of the project initiative so that the standards are integrated into national processes and are given a high level of recognition after the pilot phase at the pre-service level.

  o The secondary education department would have to work closely with TED. This would also ensure that there would be inbuilt sustainability and avenues for scaling up the project.
through SEDP II which has a component of in-servicing of teachers. The competencies would strengthen and complement this component which is funded by the World Bank office in Tanzania.

- The Morogoro Teachers College (MTC) should be the main institutional counterpart of the program, given the national-level role of College to lead on ICT integration in pre-service and in-service. Working with MTC will allow a proof of concept trialing of the contextualized competencies operationalization for systematic mainstreaming of standards across all teacher education institutions, instead of an ad-hoc adoption of standards.

- The focus of the pilot should be on pre-service training standards, but with an extension into in-service through the involvement of practicing teachers. To do this, the curriculum for the contextualized ICT competency standards should be developed in modular format so as to flexibly address pre-service and in-service training. This will allow the standards to be implemented in a continuum, covering student teachers, beginning teachers as well as practicing teachers. It will provide authentic grounds for testing the standards in real teaching and learning contexts, which are typically more constrained in resources and technology.

- The pilot will cover teachers under training to teach at secondary level and those who are already practicing from a sample of secondary schools. This is in keeping with the mandate and scope of the MTC. Standards should be contextualized through a participatory process. Teacher trainers and trainee teachers in the Teacher Colleges and Secondary Schools visited during the needs assessment should be involved in informing the pilot development of the contextualized competencies and modules. The focus would be to not simply develop contextualized competencies, modules and tools, but also to produce new knowledge from the practitioner communities of teacher educators and teachers who are applying the competencies and exploring different modalities for technology use in their professional practice.

- It is recommended that the School Inspectorate Department and the Ministry in-charge of Local Government Authorities (PMO-LARG) should be represented in the next two phases of the project. The school inspectorate department is in charge of inspection of secondary schools and teachers colleges and although they are aware of what to inspect in conventional education, they do not know what a teacher should know and be able to do with and through ICTs in a technology enabled environment. Their contributions would add value to the process during this pilot phase and any eventual scaling up of the project.
4. KEY OUTPUTS from PILOT

Contextualized ICT Competency Framework for Teachers in Tanzania

Table 2 presents an overview of the Contextualized ICT Competency Framework for Teachers in Tanzania that emerged from the workshop review and consensus building process.

Table 4: Contextualized ICT Competency Framework for Teachers in Tanzania

<table>
<thead>
<tr>
<th>Competency domains &amp; sub-domains</th>
<th>Performance Indicators Teachers...</th>
<th>Beginning Teachers...</th>
<th>Applying Teachers...</th>
<th>Proficient Teachers...</th>
<th>Transformative Teachers...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy awareness</td>
<td>research, evaluate and support school and national policy and vision for ICT integration across all subject areas</td>
<td>identify and evaluate local, national and global vision for ICT usage in education and development</td>
<td>contribute to the development of a shared school vision and planning for ICT integration that is based on national policy.</td>
<td>discuss and work collaboratively with others for vision and planning implementation that focuses on exploring new and more effective approaches for ICT integration across all subject areas in the school and wider community.</td>
<td>help embed school/ district/ national policy and vision for ICT integration by applying it in their daily work and engaging with students in innovative and exemplary practice.</td>
</tr>
<tr>
<td>Classroom Practice</td>
<td>design, adapt and develop classroom practices and school programs to implement national ICT and education reform policies</td>
<td>prepare lesson plans with a basic reference to school and/or national ICT policy and practice.</td>
<td>identify key characteristics of classroom practices and specify how these characteristics serve to implement policies (I.A.1); teachers use ICT to implement lessons based on policy (national and/or school policies for ICT integration across all subject areas)</td>
<td>identify key concepts and processes in content areas; describe the function and purpose of simulations, visualizations, data collection tools and data analysis software and how they support student understanding of these key concepts and processes and their application to the world outside the classroom. (II.1.A)</td>
<td>design, implement, and modify school/ institutional level education reform programs that implement key elements of national education reform policies. (III.A.1.) (using technology to support reform)</td>
</tr>
<tr>
<td>Curriculum &amp; Assessment</td>
<td>design or adapt/adopt units or classroom activities that incorporate a range of ICT tools and devices to promote student and community learning</td>
<td>explain how existing curriculum objectives and assessment procedures can include the use of technology for professional support and in facilitating teaching and learning strategies for students in</td>
<td>match specific curriculum standards to particular software packages and technology and computer applications and describe how these standards are supported by these applications and improvement of professional practices. (I.B.1.)</td>
<td>design units and classroom activities that integrate in a structured way a range of ICT tools and devices to support student learning and professional development.</td>
<td>design units and classroom activities that integrate a range of ICT tools and devices to help students acquire the skills of reasoning, planning, reflective learning, knowledge building and communication. (III.B.3.)</td>
</tr>
<tr>
<td>Competency domains &amp; sub-domains</td>
<td>Performance Indicators Teachers…</td>
<td>Emergent</td>
<td>Technology Literacy</td>
<td>Knowledge Deepening</td>
<td>Knowledge Creation</td>
</tr>
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<tr>
<td>Teaching and Learning Environment</td>
<td>identify technology tools that can support learning environments for enabling student's understanding of key subject-specific concepts and support professional growth</td>
<td>research and discuss ways in which technology resources can enable students to explore questions and issues in areas of interest and subject specific areas.</td>
<td>select and demonstrate the use of technology resources that enable students to explore issues and key concepts and processes in areas of interest and subject specific areas.</td>
<td>support students use ICT to acquire the skills of searching for, managing, integrating, and evaluating information to construct their own knowledge, to support their understanding of key concepts and processes in subject areas and their application to the world outside the classroom. (III.B.1.)</td>
<td>identify and discuss how students learn and demonstrate complex cognitive skills, such as information management, problem solving, collaboration, and critical thinking. (III.B.1.)</td>
</tr>
<tr>
<td>Student Experience</td>
<td>design or adapt relevant learning experiences that incorporate technology tools to promote student research and understanding</td>
<td>research and discuss ways that technology tools and resources can help students plan and manage their work</td>
<td>engage students in the acquisition of ICT skills within the context of their courses. (I.B.2.)</td>
<td>support students use ICT to acquire the skills of searching for and managing information within the context of their courses</td>
<td>support students use ICT to acquire the skills of searching for, managing, analyzing, integrating, and evaluating information to construct their own understandings. (III.B.2.)</td>
</tr>
<tr>
<td>Assessment</td>
<td>provide students with technology-based formative and summative assessments to assess content and technology skills and knowledge and use results to inform learning and product development</td>
<td>use ICT for self assessment and to assess students' acquisition of subject matter knowledge using both formative and summative assessments. (I.B.3.)</td>
<td>use ICT to create and apply knowledge- and performance-based rubrics that allow teachers to assess students' understanding of key subject matter concepts, skills and processes. (II.B.2.)</td>
<td>develop and apply ICT for self assessment and to assess students' acquisition of subject matter knowledge using both formative and summative assessments. (I.B.3.)</td>
<td>help students develop both knowledge- and performance based rubrics and apply them to assess their own understanding of key subject matter and ICT skills and concepts and the understanding of other students, as well as use these assessments to refine their products and learning. (III.B.5.)</td>
</tr>
<tr>
<td>Communication and Collaboration</td>
<td>select and use technology effectively to communicate and collaborate with students, peers and parents</td>
<td>research and demonstrate the use of technology resources for basic levels of correspondence and communication with students, parents and peers</td>
<td>use technology resources effectively to communicate information and ideas to students and related stakeholders.</td>
<td>select and use the most relevant, facilitative and effective media for enabling students to communicate to the world outside the classroom</td>
<td>help students use ICT to support communication and collaboration skills (III.B.4)</td>
</tr>
<tr>
<td>Special Educational Needs</td>
<td>use ICT diagnostic tools, assistive technologies and ICT</td>
<td>demonstrate the use of ICT to enhance the learning opportunities of</td>
<td>use ICT effectively to support development of literacy and numeracy for</td>
<td>use ICT diagnostic tools, assistive technologies and ICT resources to address</td>
<td>embed ICT in all aspects of special educational needs teaching and learning and use ICT in all</td>
</tr>
<tr>
<td>Competency domains &amp; sub-domains</td>
<td>Performance Indicators Teachers…</td>
<td>Emergent</td>
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<tr>
<td>Pedagogy</td>
<td></td>
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<tr>
<td>Planning</td>
<td>design or adapt unit plans and classroom activities to engage students in exploring real world issues and solving authentic problems using technology tools and resources</td>
<td></td>
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<tr>
<td>Problem Based Learning</td>
<td>use technology tools and resources to promote, support and model in problem solving and knowledge creation while teaching students with the support of technology tools and resources</td>
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</tr>
<tr>
<td>Student Experience</td>
<td>engage students in project plans and activities for collaborative problem solving, research, creative thinking and innovation</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Project Based Learning</td>
<td>promote project based learning using</td>
<td></td>
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</tr>
</tbody>
</table>

**Pedagogy**

- **Planning**
  - Design or adapt unit plans and classroom activities to engage students in exploring real world issues and solving authentic problems using technology tools and resources.

- **Problem Based Learning**
  - Use technology tools and resources to promote, support and model in problem solving and knowledge creation while teaching students with the support of technology tools and resources.
  - Engage students in project plans and activities for collaborative problem solving, research, creative thinking and innovation.

- **Student Experience**
  - Engage students in project plans and activities for collaborative problem solving, research, creative thinking and innovation.

- **Project Based Learning**
  - Promote project based learning using...
<table>
<thead>
<tr>
<th>Competency domains &amp; sub-domains</th>
<th>Performance Indicators Teachers...</th>
<th>Emergent</th>
<th>Technology Literacy</th>
<th>Proficient Teachers...</th>
<th>Knowledge Deepening</th>
<th>Knowledge Creation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>technology tools and resources to support student social interaction, collaboration and reflection on their own learning.</td>
<td>existing learning resources and the use of digital tools to research and collect information online and any other e-Learning resources could be used to support project-based learning.</td>
<td>tools to support key subject matter concepts and processes.</td>
<td>learning and ICT tools can support student thinking and social interaction, as students come to a deeper understand key concepts, processes, and skills in the subject matter and their application and use to solve real world problems. (II.C.1)</td>
<td>project based learning. Help students reflect on their own learning (in project-based collaboration). (III.C.5)</td>
<td></td>
</tr>
<tr>
<td>Basic Skills</td>
<td>are aware of both old and modern technologies and familiarize themselves with their potential in teaching and learning</td>
<td>are familiar with the variety of ICT tools that can support teaching and learning</td>
<td>have ability to operate and handle ICT tools.</td>
<td>demonstrate ability to use ICT tools and equipment for general use</td>
<td>demonstrate ability to relate the potential of ICT tools in enhancing learning</td>
<td></td>
</tr>
<tr>
<td>Productivity Tools</td>
<td>demonstrate ability to use ICT production tool functions to support students' innovation and knowledge creation</td>
<td>describe how existing learning could be designed or adapted to include student's use of technology tools to research and collect information online and to create a digital product</td>
<td>describe and demonstrate the basic tasks and uses of word processors, such as text entry, editing text, formatting text and printing (I.D.2) and the purpose and basic features of presentation software and other technology resources such as ICT equipment/tools such as mobile phones, TV, Digital cameras (I.D.3)</td>
<td>operate various open-ended software packages appropriate to their subject matter area, such as visualization, data analysis, role-play, simulation and online reference. (II.D.1)</td>
<td>describe the function and purpose of ICT production tools and resources (multimedia recording and production equipment, editing tools, publication software, web design tools) and use them to support students' innovation and knowledge creation. (III.D.1)</td>
<td></td>
</tr>
<tr>
<td>Authoring Tools</td>
<td>set up authoring environments to promote student knowledge construction and development of innovative products</td>
<td>research, discuss and guide students to be able to use digital tools and resources to enhance creative and innovative thinking.</td>
<td>describe the purpose and basic function of graphic software and use a graphic software package to create a simple graphic display. (I.D.4)</td>
<td>use an authoring environment or tools to design offline and/or online materials. (II.D.3)</td>
<td>enable students to use ICT authoring tools to demonstrate creative thinking, construct knowledge and develop innovative products</td>
<td></td>
</tr>
<tr>
<td>Internet</td>
<td>demonstrate ability to communicate, interact and collaborate as</td>
<td>explore and demonstrate the use of the internet for communication,</td>
<td>describe the internet and the World Wide Web, elaborate on their uses, and describe</td>
<td>evaluate the accuracy and usefulness of Web resources in support of and</td>
<td>empower students to adhere to copy right and referencing principles in order to critically evaluate the</td>
<td></td>
</tr>
<tr>
<td>Competency domains &amp; sub-domains</td>
<td>Performance Indicators Teachers...</td>
<td>Emerging Teachers...</td>
<td>Technology Literacy Teachers...</td>
<td>Proficient Teachers...</td>
<td>Transformative Teachers...</td>
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</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Collaboration and Communication</strong></td>
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</tr>
<tr>
<td></td>
<td>research and demonstrate effective use of ICT resources for communicating and collaborating with students and peers</td>
<td></td>
<td>create an email account and use it for a sustained series of email correspondence (I.D.7) and use common communication and collaboration technologies, such as (email), text messaging, video conferencing, and web-based collaboration and social environments to enhance learning. (I.D.11)</td>
<td></td>
<td>use a network and appropriate software to manage, monitor, and assess progress of various student projects. (II.D.4.)</td>
<td>engage students to use the network to support student collaboration within and beyond the classroom. (II.D.5)</td>
</tr>
<tr>
<td><strong>Administration</strong></td>
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<tr>
<td></td>
<td>use technology software to manage, monitor and assess development and progress of student learning and projects</td>
<td></td>
<td>use networked record keeping software to take attendance, submit grades, and maintain student records. (I.D.10.)</td>
<td></td>
<td>describe the function and purpose of virtual environments and knowledge building environments (KBEs) and use them to support increased knowledge and understanding of subject matter and the development of online and face-to-face communities. (II.D.2.)</td>
<td></td>
</tr>
<tr>
<td><strong>Computer Network System/management and administration</strong></td>
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<tr>
<td></td>
<td>demonstrate ability in computer/network system management and administration</td>
<td></td>
<td>update ICT tools and equipment, and install appropriate software for teaching</td>
<td></td>
<td>research and identify useful software and deal with computer safety and security</td>
<td>demonstrate ability in designing, revising and adapting appropriate teaching and learning software</td>
</tr>
<tr>
<td><strong>Educational Software</strong></td>
<td></td>
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<tr>
<td></td>
<td>evaluate and use educational software to support students knowledge acquisition, thinking, reflection, planning and creative processes</td>
<td></td>
<td>describe the function and purpose of tutorial and drill and practice software and how they support students' acquisition of knowledge of school subjects. (I.D.8) and locate off-the-shelf packages, tutorial, drill and practice</td>
<td></td>
<td>describe the function and purpose of planning and thinking tools and use them to support students' creation and planning of their own learning activities and their continuous reflective thinking and learning. (III.D.3.)</td>
<td></td>
</tr>
<tr>
<td>Competency domains &amp; sub-domains</td>
<td>Performance Indicators Teachers...</td>
<td>Emergent Technology Literacy</td>
<td>Proficient Teachers...</td>
<td>Transformative Teachers...</td>
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<tr>
<td><strong>Planning</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>Classroom Management</strong></td>
<td>address learner diverse needs</td>
<td>use whole class instruction and some interactive approaches as predominant teaching style for technology-based learning activities.</td>
<td>identify the appropriate and inappropriate social arrangements (whole class, small groups, and individual activities) to use with various technologies. (I.E.2.)</td>
<td>create flexible classroom learning environments that integrate student centred activities and flexibly apply technology to support collaboration.</td>
<td>play a leadership role in developing the school as a learning organization where innovation and continuous learning is enriched by ICT.</td>
<td></td>
</tr>
<tr>
<td><strong>Acceptable and Appropriate Uses</strong></td>
<td>advocate, model and teach procedures and policies for safe, ethical and responsible use of technology and the Internet</td>
<td>research and discuss effective practices for the safe, ethical, legal and healthy use of technology and the responsible care and handling of hardware, software and information resources.</td>
<td>model acceptable use policies for technology resources including strategies for addressing threats to security of technology systems, data and information</td>
<td>advocate, develop and teach procedures and policies for safe, ethical, responsible and appropriate use of technology and the Internet, including copyright, privacy issues, cyberbullying and security of systems, data and information</td>
<td>facilitate and engage students in developing a system for promoting and monitoring safe, legal and ethical use of digital information and technology.</td>
<td></td>
</tr>
<tr>
<td><strong>Profession</strong></td>
<td>evaluate current research and practice to make effective</td>
<td>investigate and reflect on research and professional practice for</td>
<td>use ICT to enhance their performance. (I.F.1.)</td>
<td>use ICT to access and share resources to support their activities and their</td>
<td>continually evaluate and reflect on professional practice to engage in ongoing innovation and</td>
<td></td>
</tr>
</tbody>
</table>
### Modular Outline and Digital Content

**Modular Outline**

The following section presents modular outline examples for each competency domain which were developed by the workshop participants using a Technology Pedagogy Content Knowledge (TPACK) framework. The focus was to develop modular outlines identifying objectives, activities and approaches that integrate technology, pedagogy and content that is aligned to the contextualized competencies. The activities described in the TPACK modular outlines for each competency domain are examples only, not a definitive list of activities required for teachers to meet competency standards or indicators. There are many different activities and approaches that could demonstrate implementation of the contextualized competencies. The activities serve as examples of exemplary planning for technology use in teaching and learning programs by teacher educators and teachers.

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3At the heart of TPK is the dynamic relationship between content, pedagogy, and technology. The TPACK approach considers the interactions among these three elements and examines all possible interactions among content, pedagogy and technology, namely, Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and Technological Pedagogical and Content Knowledge (TPACK).
The involvement of teachers and teacher educators in TPACK modular design for technology integration is in line with the current view in the literature of understanding teachers as producers (designers) of technology programs as well as the traditional view of teachers as consumers (users) of technology programs (Koehler & Mishra, 2008).

See also appendix 1 for summary overview of TPACK Framework

Table 5: A Modular Design Outline for the Policy Competency Domain

<table>
<thead>
<tr>
<th>Standard Domain</th>
<th>Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard sub-domain</td>
<td>Classroom practice PK</td>
</tr>
<tr>
<td>Standard performance indicator</td>
<td>Teachers design, adapt and develop classroom practices and school programs to implement national ICT and education reform policies TPK</td>
</tr>
<tr>
<td>Standard performance level</td>
<td>Technology Literacy Level (applying level)– teachers identify key characteristics of classroom practices and specify how these characteristics serve to implement policies; teachers use ICT to implement lessons based on policy (national and/or school policies for ICT integration across all subject areas) TPCK</td>
</tr>
</tbody>
</table>

Table 6: A Modular Design Outline for the Curriculum & Assessment Competency Domain

<table>
<thead>
<tr>
<th>Standard Domain</th>
<th>Curriculum and Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub Standard domain</td>
<td>Teaching and learning environment PK</td>
</tr>
<tr>
<td>Standard performance indicator</td>
<td>Student Teachers identify technology tools that can support teaching and learning environments for enabling student's understanding of key subject-specific concepts and professional growth TCK</td>
</tr>
<tr>
<td>Standard performance level</td>
<td>Technology Literacy Level (applying level): Student teachers match specific curriculum standards to particular software packages and technology and computer applications and describe how these standards are supported by these applications and improvement of professional practices. TCK</td>
</tr>
</tbody>
</table>

Note: Acronyms depict evidence of Technology, Pedagogy and Content Knowledge (TPACK) integration
## Table 7: A Modular Design Outline for the Pedagogy Competency Domain

<table>
<thead>
<tr>
<th>Standard Domain</th>
<th>Curriculum and Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology resources to facilitate content</td>
<td>• Prepare and demonstrate the use of various technology resources to facilitate T/L process</td>
</tr>
<tr>
<td>• Have participants analyze and select appropriate technology resources to facilitate content</td>
<td>• Perspectives on the topic and approaches for integrating appropriate technology to facilitate the topic content (web sites, paper-based and virtual primary resources, online newspapers, journals, digital archives)</td>
</tr>
<tr>
<td>• Have students respond to questions on concepts posed by peers, textbook assignments or tutors using a range of software and hardware tools - discussion boards, wikis, quiz and polling software, textbooks</td>
<td></td>
</tr>
</tbody>
</table>

Note: Acronyms depict evidence of Technology, Pedagogy and Content Knowledge (TPACK) integration

### Pedagogy

<table>
<thead>
<tr>
<th>Learning Objectives TCK</th>
<th>Examples of Learning Activities TCK</th>
<th>Examples of Resources/ Approach TCK</th>
</tr>
</thead>
<tbody>
<tr>
<td>By the end of this module the teacher should be able to:</td>
<td>• Describe how the use of ICT and specific types of software can support the learners’ acquisition of school subject matter concepts and knowledge.</td>
<td>• Explore the use of modeling, simulation construction, graphic software, multimedia production tools to help students develop mental models of subject matter concepts and processes.</td>
</tr>
<tr>
<td>• Describe hardware components/items of ICT</td>
<td>• Demonstrate ways in which technology use can supplement didactic (i.e. teacher centred and knowledge transmission focused) classroom teaching</td>
<td>• Use blogs, discussion forum &amp; web browser for engaging students in small and large groups in dialogue and exploration of their ideas and understanding on the use of technology to support teaching of key subject topics and concepts.</td>
</tr>
<tr>
<td>• Identify appropriate software for teaching and learning in a particular lesson.</td>
<td>• Select suitable hardware and software relevant to the lesson concepts</td>
<td></td>
</tr>
<tr>
<td>• Select suitable hardware and software relevant to the lesson concepts</td>
<td>• Use the hardware and software in the classroom situation</td>
<td></td>
</tr>
<tr>
<td>• Use the hardware and software in the classroom situation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Acronyms depict evidence of Technology, Pedagogy and Content Knowledge (TPACK) integration
### Table 8: A Modular Design Outline for the ICT Competency Domain

<table>
<thead>
<tr>
<th>Standard Domain</th>
<th>ICT</th>
<th>ICT- Productivity Tools: TCK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Sub-domain</td>
<td>ICT-</td>
<td>Teachers demonstrate ability to use ICT production tool functions to support students’ innovation and knowledge creation: TCK</td>
</tr>
<tr>
<td>Standard performance indicator</td>
<td>Teachers demonstrate ability to use ICT production tool functions to support students’ innovation and knowledge creation: TCK</td>
<td></td>
</tr>
<tr>
<td>Standard performance level</td>
<td>Emergent Level (beginning stage) - Teachers describe how existing learning could be designed or adapted to include student’s use of technology tools to research and collect information online and to create a digital product: TCK</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ICT</th>
<th>Learning Objectives TCK</th>
<th>Examples of Learning Activities CK</th>
<th>Examples of Resources/ Approach TPCK</th>
</tr>
</thead>
<tbody>
<tr>
<td>By the end of the module student teachers should be able to identify and use technology tools:</td>
<td>• Demonstrate the use of a search engine;</td>
<td>• Engage students in searching for and reading information using online databases, online encyclopedias, eBooks, and search engines available on the school/institutional/national website/portal and the Internet</td>
<td></td>
</tr>
<tr>
<td>• to research, collect information online</td>
<td>• Discuss and demonstrate simple keyword and Boolean searches and scanning;</td>
<td>• Set up a discussion forum to encourage students to discuss progress on their research outside the classroom and to clarify the strategies they have used in their search and retrieval of information</td>
<td></td>
</tr>
<tr>
<td>• to create a digital product</td>
<td>• Have students search for websites on their favorite topics or their current projects</td>
<td>• Have student groups set up a wiki for joint collaboration on building information database for project based learning in their subject areas</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Have students supplement their information search using traditional technology (books and documents)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Have students discuss the keyword strategies they used with the group for discussion</td>
<td></td>
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</tr>
</tbody>
</table>

Note: Acronyms depict evidence of Technology, Pedagogy and Content Knowledge (TPACK) integration

### Table 9: A Modular Design Outline for the Organization & Administration Competency Domain

<table>
<thead>
<tr>
<th>Standard Domain</th>
<th>Organization and Administration</th>
<th>Classroom management PK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Sub-domain</td>
<td>Teachers address learners diverse need by using learner centered strategy and managing individual group and class assess ICT resources PK</td>
<td></td>
</tr>
<tr>
<td>Standard performance indicator</td>
<td>Emergent Level (beginning level) – Use whole class instruction as predominant teaching style for technology-based learning activities TPK</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Organization &amp; Administration</th>
<th>Learning Objectives TCK</th>
<th>Examples of Learning Activities CK</th>
<th>Examples of Resources/ Approach TPCK</th>
</tr>
</thead>
<tbody>
<tr>
<td>By the end of the module teachers should be able to integrate the use of ICT into ongoing teaching and learning activities</td>
<td>Discuss and give examples of different ways that limited classroom ICT resources can be used in teaching and learning by:</td>
<td>Students can identify:</td>
<td></td>
</tr>
<tr>
<td>Specifically teachers should be able to:</td>
<td>• individual students</td>
<td>• different hardware (mobile phones-laptops-flipcharts);</td>
<td></td>
</tr>
<tr>
<td>a) identify the diversity of learners needs</td>
<td>• pairs</td>
<td>• and software technologies (story construction software, web quests, concept mapping software, word processors, presentation software, storyboard tools) for supporting</td>
<td></td>
</tr>
<tr>
<td>b) identify relevant ICT resources</td>
<td>• small groups</td>
<td>• ‘think-pair-share’,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>to supplement teaching and learning.</td>
<td>• ‘gallery walk’,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Have students create lesson plans that include the use of ICT to supplement classroom teaching and address the diverse need of learners</td>
<td>• ‘project work’ strategies for instructional use with</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• individual,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• pair,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• small group</td>
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<tr>
<td></td>
<td></td>
<td>• and large group levels.</td>
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</tr>
</tbody>
</table>

Note: Acronyms depict evidence of Technology, Pedagogy and Content Knowledge (TPACK) integration
Table 10: A Modular Design Outline for the Teacher Development Competency Domain

<table>
<thead>
<tr>
<th>Standard Domain</th>
<th>Teacher Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Sub-domain</td>
<td>Planning CK</td>
</tr>
<tr>
<td>Standard performance indicator</td>
<td>Teachers evaluate current research and practice to make effective use of ICT in support of their own professional development and student learning TCK</td>
</tr>
<tr>
<td>Standard performance level</td>
<td>Knowledge Deepening Level (proficient level) – Teachers use ICT to access and share resources to support their activities and their own professional development TCK</td>
</tr>
</tbody>
</table>

Teacher Development

<table>
<thead>
<tr>
<th>Learning Objectives TCK</th>
<th>Examples of Learning Activities CK</th>
<th>Examples of Resources/ Approach TPCK</th>
</tr>
</thead>
<tbody>
<tr>
<td>By the end of the module, teachers should be able to use ICT to access and share resources to support their activities and their own professional development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objectives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• To enable teachers to use ICT networking resources such as email, forums, search engine etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• To enable teachers to share resources to support teaching and learning activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• To enable teachers to use ICT to support their own professional development (online professional courses, professional forums, blogs, skype conferencing with other teachers e.g. video conferencing, teleconferencing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Discuss the various sources of online information and other resources that can be used to support professional development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Have participants conduct online searches for materials that support their professional development</td>
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<td></td>
</tr>
<tr>
<td>• Have teachers share and discuss the results of these searches and plans for implementation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Determine teaching and learning strategies to guide the teachers in groups to search teaching and learning materials from different sources via the Internet, to create e-mails, to use search engines.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Have teachers use ICT to support their own professional development (online professional courses, professional forums, blogs, Skype conferencing with other teachers e.g. video conferencing, teleconferencing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Build teachers knowledge and skills on searching on line professional courses from different registered colleges and universities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Guide teachers in groups to create e-materials in CD, DVD and to use e-learning platform (moodle) for sharing knowledge and resources with professional peers inside and outside the school/institutional community</td>
<td></td>
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</tr>
</tbody>
</table>

Note: Acronyms depict evidence of Technology, Pedagogy and Content Knowledge (TPACK) integration

Digital content

ICT-CFT modules require digital content for training teachers. One of the accomplishments of pilot was competencies against digital education resources. This first iteration of the contextualized framework was used on different digital resources to mapping against the different levels of the contextualised ICT competencies. Content was exhibited by stakeholders from the public and private sector among which we had Morogoro Teachers College, Intel, Designmate, Open University of Tanzania, Bridge IT, Dar Es Salaam University College of Engineering and Technology, Dar Es Salaam University College of Education and Open Source digital content.

In the capacity building process, during the four day workshop, the core group of national facilitators were exposed to different digital learning resources. The participants were required to identify the range of competencies that would be required by teachers to use the content exhibited in teaching and learning. Below is a brief outline of what was exhibited with the details of the exhibition and the content mapping task in Appendix V. The types of content that participants were exposed to fell in three categories:

- Locally generated content –web and mobile based
- Content by private providers
- Open learning resources
(1) Locally generated content

**Morogoro Teachers College** exhibited on “Transport in the human body” in biology subject. The project was aimed at demonstrating how ICT can be used to simplify teaching and learning activities in different subject areas especially in abstract concepts. Instead of the teacher having to draw static diagrams on charts (as has been the case over centuries) the demonstration showed how teachers can access already developed resources and use these to enhance their classroom practice. The digital content can be either downloaded as animations or created by the teacher which would require ICT skills at the application and knowledge creation levels of the ICT competency framework.

**Open University of Tanzania** presented on Mobile Learning at Open University of Tanzania. Since 2008 the Open University of Tanzania (OUT) was engaged in the project on how to use mobile phone technology to facilitate teaching and learning for students who are in the rural areas with no access to computers. The project was initially piloted for the in-service teacher training and later on extended to agricultural extension officers in rural Tanzania to facilitate traditional poultry keeping. The demonstration exhibited how to upload content in mobile phones, the study materials in formatted PowerPoint presentations with audios, videos and text. For those materials to be accessible, they require phones with multimedia capability and memory card of at least 4GB. The technology also allowed for text messaging from LMS to mobile phones of students and teachers.

Currently, training materials are available in the system for diploma courses which are developed in such a way that even the local farmers are able to understand and can be motivated to take the courses themselves instead of waiting for the extension officer. This would provide a practical solution for in-servicing teachers in deep rural areas as the skills required to operate a mobile phone are at the beginner’s level.

**Bridge IT** demonstrated how mobile phones can be used to deliver rich multimedia content in primary schools in Kiswahili. The content has been developed locally and the video content is usually delivered entirely over local 2.5G/3G mobile networks, for display on a television through a mobile phone to support teachers in the classroom. Although the high-end Nokia smart phones used by teachers here are too expensive to consider for mass purchase, in most places the costs of handsets with this sort of functionality will fall in the coming years, and the availability of reliable broadband mobile networks will so also increase.

Teacher professional development and on-going pedagogical support to develop learner-centered lesson plans and teacher’s guides is required. The skills identified in the use of this content were identified between the technology literacy level and application levels.

**Dar Es Salaam University College of Engineering and Technology** demonstrated on Learning Material Delivery using CD-ROM and TanSSe-L System. The demo is a result of an e-Learning research for secondary schools in Tanzania, which was conducted at the University of Dar es Salaam and the Blekinge Institute of Technology in Sweden. The research addressed the problems of shortage of learning and teaching materials and inadequacy of qualified teachers using ICT tools.

The Demo showed an e-Learning environment where the e-Learning material can be delivered directly using the CD-ROM and be accessed by individual students or a group of students. The material can also be delivered using centralized TanSSe-L system via the Internet, schools with Internet connectivity can access the learning material from the central server. The other option is that the user can access learning materials via the Local Area Network (LAN), in this TanSSe-L system and e-Learning content can be replicated into a local server, whereby nearby schools can form a
cluster and the local server be placed in one of the schools. The users can thereafter access the
material if connected to a LAN configuration. The demo showed a blended mode of content delivery
by using TanSSe-L system, CD-ROM and face to face (F2F) in supplementing the traditional learning
and not replacing the traditional way of learning.

The material was developed with the active participation of teachers and students from the pilot
schools. The demonstration content was mathematics subject for Form III (11th Grade). The content
is multimedia, and possesses interactivity using animation some of which incorporated audio and
video clips for explaining tough concepts. The learning material structure is based on Transmissive
and Constructivism pedagogical models. Authoring tools used were a combination of open source,
proprietary and web based packages.

The TanSSe-L system provides a centralized learning environment and enhances collaboration using
its available communications tools.

**Dar Es Salaam University College of Education** made two demonstrations both of which were
reflecting on what teachers created during the course of TPACK training. One of the demonstrations
was a simple animation on PowerPoint, which was about the Electrolysis process. In this animation
teachers wanted to show what takes place during electrolysis. Thus they animated the movement of
ions between cathodes. As shown in [Content Development using PowerPoint in a TPACK course
DUCE.ppt](#)

The second content was about first aid provision; A video on the process of providing first aid to a
victim was developed by teachers, and used for teaching in a classroom. In the video that was
exhibited, students were studying and one of the student complained that she had a headache and
suddenly fell down. Other students took the initiative of providing First Aid to the student who had
fallen down and this was recorded. This video was presented in the classroom as a teaching aid by
the teachers to elicit discussions on the steps taken in the provision of First Aid.

(2) Content by private providers

**Intel** gave a demonstration that was showcased as an ICT solution in the Education for Tanzania
covering all areas of the Intel World Ahead program. The Intel Teach program is based on 4 pillars
which are, access to technology, digital education content, connectivity and teacher training. The
technology and content was show-cased and teacher training was advised on as well. The digital
content on how a teacher can use ICTs to manage, control classroom activities and create an
interactive learning environment using the Intel classmate were also showcased to the groups. It
was observed that, for teachers to create a collaborative learning environment they would need a
cross section of skills beyond technology literacy level.

**Designmate** presented a range of educational content and innovative ways in which the teacher can
enrich classroom activities through use of locally available materials. The content is a combination of
3D videos, simulations, experiments, learning activities, quizzes, texts, images, weblinks & learning
objects known as Eureka. Eureka is a 3D educational software solution for explaining effectively
concepts of science and mathematics. It equips teachers with high quality content and thus adds
value to traditional learning. The digital content exhibited was noted not to require a very high level
of skills on the competency framework as most of the content is already highly developed.
However, teachers require a good mastery of ICTs in the application stage and manipulation of ICTs
for maximum productivity and effective use of resources provided.
(3) Open Source Digital Content

The core group was also exposed to digital content from open resource domain. A guideline for evaluating open source digital content was also provided. Below is a summary of open digital content that were demonstrated.

- **Open Education Resources for Teacher Educators in Africa**: these are resources that have been produced by Teacher Education in Sub-Saharan Africa (TESSA) describing some important aspects of teaching and learning. TESSA materials, have been created by teachers and teacher educators working in a variety of contexts. An expert team has prepared handbooks suggesting some of the ways in which the TESSA community and materials can be used to plan and implement teacher education and training programs, courses and activities. [http://www.tessafrica.net/index.php?option=com_content&view=article&id=72&Itemid=253](http://www.tessafrica.net/index.php?option=com_content&view=article&id=72&Itemid=253)

- **Open Text books**: The formation of the College Open Textbooks coincides with the growing international interest in open educational resources and the need to move to open digital textbooks as a way of reducing the cost of public education and saving students millions of dollars. This is by increasing the number of open high-quality textbooks available online as alternatives to expensive printed textbooks sold by publishers. This collection is focused on driving awareness and adoption of open textbooks. This includes providing training for instructors adopting open resources, peer reviews of open textbooks, and mentoring online professional networks that support authors opening their resources, and other services. [http://www.collegeopen textbooks.org/about-us/who-are-we.html](http://www.collegeopen textbooks.org/about-us/who-are-we.html)

- **Open Education Resources (OER)**: the OER provides free-to-use teaching and learning content from around the world. [http://www.oercommons.org/](http://www.oercommons.org/)

- **Free and Open Source Educational Software**: This collection has been developed with an aim of making finding software easier by categorising resources by Key Learning Areas used in Education. Under each category there are links to useful websites that provide information or free resources. This collection of Free and Open Source software for education is available and varies from mathematics to music, from science to graphics, from programming to educational games and includes office tools, business software, network tools and security software. [http://os.cqu.edu.au/oswindsdvd/doc/README.html](http://os.cqu.edu.au/oswindsdvd/doc/README.html)

- **The African Digital Library**: This is a library comprising of more than 8000 full-free text books created exclusively for residents in Africa. [http://www.africaeducation.org/adl/Default.htm](http://www.africaeducation.org/adl/Default.htm)

- **Schoolforge**: Schoolforge provides a one stop shop for free education software, free multimedia software, antispyware and other resources related to technology use in an education setting. All of these resources are from free and open software. [http://www.schoolforge.net](http://www.schoolforge.net)

- **Shodor Interactive tools**: Shodor interactive tools’ goal is to improve math and science education through the effective use of modeling and simulation technologies (Computational Science). Shodor is a national resource for computational science education and serves students and educators nationwide. The online education tools such as
Interactivate and the Computational Science Education Reference Desk (CSERD), a Pathway Portal of the National Science Digital Library (NSDL), help transform learning through computational thinking. [http://www.shodar.org/interactivate/tools/](http://www.shodar.org/interactivate/tools/)

- **Ma3bar:** Ma3bar is the Arab Support Center for Free and Open Source Software. Since its inception by UNDP-ICTDAR, UNESCO, and the University of Balamand, the center strives to disseminate free and open source software as a philosophy and culture in academia and Arab societies. Ma3bar is committed to contributing to social and economic development in the Arab region by promoting the use and development of free and open source software, and by developing and conducting training programs on such software, to ensure that more Arab communities have affordable access to information technologies. [http://ma3bar.org/en/english/455-open-source-applications-for-math-teachers](http://ma3bar.org/en/english/455-open-source-applications-for-math-teachers)

**Assessment and Certification Options for ICT-CFT**

The Contextualized Competency Framework for Teachers in Tanzania define what teachers should know and be able to do with technology in education or the fundamental concepts, knowledge, skills, and attitudes for applying technology in educational settings. The competencies cover what pre-service/ in-service teacher preparation programs should address on the modeling of technology use and providing experience using technology in educational practice. All student teachers/practicing teachers in ICT teacher development programs can be expected to meet these standards as a result of providers (teacher college pre-service providers/in-service providers partners) making available appropriate and sufficient technology related capacity building opportunities and essential conditions for technology application in practice.

Outcomes are defined by performance indicators or descriptors of achievement at the different stages (beginning, applying, proficient, and transformative) in a teacher’s progression path of competency development. It is important to clarify that success in attaining the general progress indicators will depend on the teacher’s support system at school or institutional level. This would describe a support system that is based on shared vision, strong leadership, curriculum and assessment that is focused on national policy for student centered learning, supportive policies on ICT planning and budgets, technical support and other such conditions that need to be defined and clarified by stakeholders. Without such a support system in place, it is very difficult for teachers to attain a transformative competency level for ICT use in educational practice.

**Assessment of teacher competency levels should**

- be accessible to all beginning and practicing teachers;
- be easily administered and affordable for the assessing body and participants;
- involve a range of tools to reflect the varying aspects of teaching practice;
- provide support mechanisms and assistance for teachers undertaking assessment;
- provide detailed feedback from the assessment process, including opportunities for further development;
- provide some form of recognized credentialing by the employing authority in some tangible form such as certification, a salary increase and/or promotion

**A common model of assessment is the combination of e-portfolio with artifacts along with assessments in a proctored environment**
Selecting **artifacts for an e-portfolio** is the first step in presenting **evidence** of how the competencies for teachers have been met. Teachers will also need to provide some form of **written commentaries** (e-journal) to provide insight into the rationale for choosing each piece of evidence that has been presented.

Table 9 contains the six contextualized competency domains, related performance indicators and portfolio artifacts that were defined by teams in the workshop consultation. The artifacts described are examples only, not a definitive set required to meet the competency performance indicators. There are many different artifacts that could be defined by teachers, teacher educators, schools and institutions that can demonstrate the achievement of the contextualized standards for teachers in Tanzania.

**Table 11: ICT-CFT teacher competencies and performance indicators**

<table>
<thead>
<tr>
<th>ICT-CFT Competency Domains</th>
<th>Performance Indicators for Assessment</th>
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</table>
| **1. POLICY & VISION**    | a. research, evaluate and support school and national policy and vision for ICT integration across all subject areas  
Teachers understand local, national and global policy issues regarding the goals, objectives, standards and strategies for ICT use in education and classroom practice.  
b. design, adapt and develop classroom practices and school programs to implement national ICT and education reform policies |
| **2. CURRICULUM & ASSESSMENT** | a. design or adapt/adopt units or classroom activities that incorporate a range of ICT tools and devices to promote student and community learning  
Teachers use their knowledge of curriculum content, assessment and technology to facilitate experiences for enabling student understanding of subject-specific concepts, research, collaboration and communication.  
b. identify technology tools that can support learning environments for enabling student's understanding of key subject-specific concepts and support professional growth  
c. design or adapt relevant learning experiences that incorporate technology tools to promote student research and understanding  
d. provide students with technology-based formative and summative assessment to assess content and technology skills and knowledge and use results to inform learning and product development  
e. select and use technology effectively to communicate and collaborate with students, peers and parents  
f. use ICT diagnostic tools, assistive technologies and ICT resources to address curriculum objectives and students with special educational needs |
| **3. PEDAGOGY** | a. design or adapt unit plans and classroom activities to engage students in exploring real world issues and solving authentic problems using technology tools and resources  
Teachers use their knowledge of methods and processes of teaching and the use of technologies in teaching to engage students in authentic problem solving, inquiry and project based learning experiences that support social interaction, collaborative knowledge production, innovation and communication.  
b. use technology tools and resources to promote, support and model in problem solving and knowledge creation while teaching students with the support of technology tools and resources promote, support and model problem-solving and knowledge creation while teaching students with the support of technology tools and resources  
c. engage students with the support of technology |

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<tr>
<th>ICT-CFT Competency Domains</th>
<th>Performance Indicators for Assessment</th>
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<tr>
<td></td>
<td>tools and resources in project plans and activities for collaborative problem solving, research, creative thinking and innovation</td>
</tr>
<tr>
<td></td>
<td>d. promote project based learning using technology tools and resources to support student social interaction, collaboration and reflection on their own learning</td>
</tr>
<tr>
<td></td>
<td>e. structure lessons to incorporate multi-media production, web production and publishing technologies to support student knowledge production and communication with other audiences</td>
</tr>
<tr>
<td></td>
<td>a. are aware of both old and modern technologies and familiarize themselves with their potential in teaching and learning</td>
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<tr>
<td></td>
<td>b. demonstrate ability to use ICT production tool functions to support students' innovation and knowledge creation</td>
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<td></td>
<td>c. set up authoring environments to promote student knowledge construction and development of innovative products</td>
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<td></td>
<td>d. demonstrate ability to communicate, interact and collaborate as well as develop student capacity to critically evaluate the accuracy and usefulness of web resources to support learning goals and strategies</td>
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<td></td>
<td>e. use common communication and collaboration technologies to locate information, people and resources for developing local and global collaborative projects/ initiatives</td>
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<tr>
<td></td>
<td>f. use technology software to manage, monitor and assess development and progress of student learning and projects</td>
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<tr>
<td></td>
<td>g. demonstrate ability in computer/network system management and administration</td>
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<tr>
<td></td>
<td>h. evaluate and use educational software to support students knowledge acquisition, thinking, reflection, planning and creative processes</td>
</tr>
<tr>
<td>4. ICT</td>
<td>a. exhibit a leadership role in creating a vision for technology infusion into curriculum and classroom practice</td>
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<td></td>
<td>b. participate in shared decision making for use of ICT in school planning and the development of technology skills in others</td>
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<td></td>
<td>c. address learner diverse needs by using learner centred strategies and managing individual, group and class access to ICT resources</td>
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<td></td>
<td>d. advocate, model and teach procedures and policies for safe, ethical and responsible use of technology and the internet</td>
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<tr>
<td>5. Teachers use their knowledge about various technologies, from low-tech technologies such as pencil and paper to high-tech technologies such as the Internet, digital video, radio and software programs to support teaching and learning strategies, student knowledge construction and innovation.</td>
<td>a. evaluate current research and practice to make effective use of ICT in support of their own learning</td>
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<td></td>
<td>b. participate in shared decision making for use of ICT in school planning and the development of technology skills in others</td>
</tr>
<tr>
<td>6. ORGANIZATION &amp; MANAGEMENT</td>
<td>a. exhibit a leadership role in creating a vision for technology infusion into curriculum and classroom practice</td>
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<td></td>
<td>b. participate in shared decision making for use of ICT in school planning and the development of technology skills in others</td>
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<td></td>
<td>c. address learner diverse needs by using learner centred strategies and managing individual, group and class access to ICT resources</td>
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<td></td>
<td>d. advocate, model and teach procedures and policies for safe, ethical and responsible use of technology and the internet</td>
</tr>
<tr>
<td>7. TEACHER DEVELOPMENT</td>
<td>a. evaluate current research and practice to make effective use of ICT in support of their own learning</td>
</tr>
<tr>
<td>ICT-CFT Competency Domains</td>
<td>Performance Indicators for Assessment</td>
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</tbody>
</table>
| Teachers continuously evaluate use of technology to improve their own professional practice and student learning participate in local and global learning communities and become life-long learners contributing to the effectiveness and regeneration of the teaching profession. | professional development and student learning  
  b. participate in local and global learning communities to explore creative applications of technology and share and discuss good practices  
  c. contribute to the effective use of ICT to enhance the teaching profession and the school community |
5. Going Forward

Next stage 1: Validation of competencies

The workshop participants discussed parameters for validating the first iteration of the ICT Competency Framework for Teachers in Tanzania. There is the opportunity to present the first draft for further review and validation by national and international experts. The framework can also undergo review by the Ministries of Education and Vocational Training and of Science and Technology to clarify whether there should be any modifications, omissions or additions in light of Ministry regulatory frameworks.

Next stage 2: Upgrading teachers to the required competency level

The workshop participants discussed the need to develop an action plan to maintain the momentum of the competency contextualization and for upgrading teachers to competency levels for ICT integration that are defined by the framework and National ICT in Education policy. The competency framework gives an overview of benchmark competencies that teachers can attain at beginner, applying, proficient and transformative stages of technology use in educational practice. The country needs analysis report with the importance-prioritization and infrastructure surveys bring together other background research which gives some clarity on current levels of teacher and institutional preparedness for ICT use in educational practice. By looking at where teachers are now and where they need to be, it will be possible to identify gaps in performance: areas where teachers are not proficient or need further capacity building opportunities to get them up to the competency standard.

For example, findings in the needs analysis report suggest that many teacher educators in Tanzania are already at a reasonably proficient level in ICT knowledge and understanding as a result of capacity building programs and deployment of ICT infrastructure in all teacher colleges. However, the importance-prioritization survey suggests that teacher educators are not yet able confident or comfortable with using ICT in their subject specific areas for course delivery. Teacher educators and teachers identified competencies for ICT integration in the curriculum as both important and a priority for capacity building. This would suggest that teacher educators and teachers require capacity building in how to use ICT effectively in the classroom to teach content and to support national policy for interactive student-centred pedagogies as well as improving their own proficiency in ICT.

Figure 2: Performance Gap Analysis

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<table>
<thead>
<tr>
<th>Current Situation</th>
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<tbody>
<tr>
<td>What the teachers know about ICT, what they are able to do with ICT now</td>
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</table>

<table>
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<tr>
<th>Future Situation</th>
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<tbody>
<tr>
<td>What the teachers should know about ICT, what they should be able to do with ICT</td>
</tr>
</tbody>
</table>
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Future Situation – Current Situation = Performance Gap

The next stage would be having identified the performance gap, to use the results of the competency and infrastructure mapping to identify the capacity building gaps.
What teachers need – What has been/is being provided = gaps in CAPACITY BUILDING

Having identified capacity building gaps and what the current teacher development models can offer, the next stage is to prioritize needs for the beginner/applying/proficiency/transformative phases of teacher development programs and to ensure that teachers have the opportunity to meet the required competency attributes identified for each phase.
References


Index Mundi (2011) Tanzania Demographics Profile [Online], available at: http://www.indexmundi.com/tanzania/demographics_profile.html retrieved 6 April 2011


Appendix 1 – Technology Pedagogy and Content Knowledge (TPACK) Framework

The Technology Pedagogical Content Knowledge (TPACK) -based design guide has been developed primarily along the following definitions of TK, CK, PK, PCK, TCK, TPK and TPACK:

1. **Technology Knowledge (TK):** Technology knowledge refers to the knowledge about various technologies, ranging from low-tech technologies such as pencil and paper to digital technologies such as the Internet, digital video, interactive whiteboards, and software programs.

2. **Content Knowledge (CK):** Content knowledge is the knowledge about actual subject matter that is to be learned or taught.

3. **Pedagogical Knowledge (PK):** Pedagogical knowledge refers to the methods and processes of teaching and includes knowledge in classroom management, assessment, lesson plan development, and student learning.

4. **Pedagogical Content Knowledge (PCK):** Pedagogical content knowledge blends both content and pedagogy with the goal being to develop better teaching practices in the content areas.

5. **Technological Content Knowledge (TCK):** Technological content knowledge suggests that teachers understand that, by using a specific technology, they can change the way learners practice and understand concepts in a specific content area.

6. **Technological Pedagogical Knowledge (TPK):** Technological pedagogical knowledge refers to the knowledge of how various technologies can be used in teaching, and to understanding that using technology may change the way teachers teach.

7. **Technological Pedagogical Content Knowledge (TPACK):** Technological pedagogical content knowledge refers to the knowledge required by teachers for integrating technology into their teaching in any content area.

Koehler and Mishra (2008)