Ghana Senior High Schools Connectivity Project

Workshop Report on
“Review of ICT, Science, Mathematics, and English subject curricula for ICT Integration” and
“ICT Competency Framework for Teachers” for Senior High Schools in Ghana

Senior High Schools Connectivity Project - Ghana
26th – 29th November 2012
Anita Hotel, Ejisu, Kumasi
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Introduction

The Ghana Senior Schools Connectivity (GSSC) project was identified with the sole purpose of increasing access to information and communication technology education for students in Ghana by providing and supporting internet connectivity to SHS in Ghana.

The MOE, GES, USAID, GESCI and Vodafone are the implementing partners. MOE will facilitate the policy process, GES will provide an implementation and project coordination support through enabling the required structures. USAID will provide the financial support, Vodafone as the connectivity service provider will set up of connectivity infrastructure at the schools. GESCI will provide the technical assistance and oversee the implementation of the project to ensure that all deliverables are realized.

The GSSC project recognizes that teachers play a critical role in the integration of ICT in teaching and learning, and their capacity must be built systematically to use ICT in their professional practice. With these goals in mind the projects seeks to contextualize and implement and ICT Competency Framework for Senior High School Teachers in Ghana. The contextualized framework will draw on various global and regional competency standards, those captured by ICT Competency Framework for Teachers (ICT-CFT) developed by UNESCO and educational and industry partners, plus international, regional and national frameworks, notably, the International Society for Technology in Education (ISTE) National Educational Standards for Teachers, USA, the ICT-enhanced Teacher Standards for Africa (ICTeTSA), the European Teacher Competency and Qualifications Framework (eTQF), the South African Teacher Training and Professional Development Framework in ICT and the National Centre for Technology in Education (NCTE)’s e-Learning Roadmap, Ireland.

Rationale for the workshop

The 4-day workshop focused on:
- The review of the ICT, Science, Mathematics and English subject curricula for Senior High Schools in order to facilitate the integration of ICTs in these subjects to facilitate learning with and learning through ICTs to enhance learning and teaching and improve student achievement in these subjects and
- Contextualizing and validating ICT competencies for High School Teachers in Ghana, and for building hands-on capacity among master trainers and facilitators from curriculum bodies and educational institutions to integrate the competencies in teacher curriculum frameworks.

Objectives of the workshop

Over the 4 days’ workshop participants were provided with opportunities to:
- Articulate the learning priorities in the mentioned subjects
- Identify how ICTs can facilitate the attainment of the priorities and improve teaching and learning in these subjects
- Identify key learning opportunities/topics in each subject for the integration of ICTs
- Reflect on how assessment practices and procedures would have to be aligned to support learning with and through ICTs
- Identify what ICTs would be appropriate for the context and topics/purposes identified
- Identify teacher preparation needs for ICT integration
- Develop guidelines for implementation of review findings.
- Be familiarized with global ICT Competency Standards using international, regional, and national examples,
- Contextualize standards and harmonize these with the national educational objectives and
- Develop hands-on capacity building tools for integration of competencies - tools for building training modules and teacher assessment frameworks.
- Develop Teacher ICT competencies for Teachers in Senior High Schools
- Develop a plan for Implementation of Teacher ICT Competencies

**Workshop Participants**

The workshops was attended by participants () representing key stakeholders, e.g. educational policy makers in the areas of curriculum development for the ICT, Mathematics, Science and English subjects, teacher education, ICT4E, assessment and examinations, and school inspectorate, teacher-educators in ICT, Science, Mathematics and English (SME) specialist areas from pre-service and in-service institutions, practicing senior high school teachers from SME curriculum committees, senior high school principals, ICT coordinators and students. In going forward, the GES, CRDD and TED together with other key parties, will be responsible for validation and incorporation of recommendations, revision of the subject curricula, preparation of teachers and implementing of revised curricula.

A list of participants who attended the workshop can be accessed in appendix 1.

**Workshop Facilitation, Format and Programme:**

The workshops were facilitated by different teams in each thematic area from the Global E-Schools and Communities Initiative (GESCI) facilitators – with Dr. Patti Swarts, GESCI General Manager of Regional and Country Programs and Ms. Esther Wachira, Connectivity Project GESCI Manager facilitating the ICT Curriculum theme of the workshop process and Ms. Mary Hooker, GESCI Senior Education Specialist and Ms. Esther Wachira facilitating the ICT Teacher Competency theme in the workshop process.

The facilitation format was to use a participatory consultative approach that integrated interactive sessions of presentations, open discussions, group work, mapping exercises and plenary sessions.

The workshop programme in appendix 2 outlines the sessions for the workshop process. Evaluations for days 1, 2 and 3 of the workshop were carried out to assess participant reaction to the workshop process and to elicit suggestions for improvement.

The following sections present the ICT Curriculum and Teacher Competency workshop proceedings as carried over the four days of the workshop process.

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1 ICT Curriculum and Teacher Competency & Workshop Evaluation Day 1; ICT Curriculum and Teacher Competency & Workshop Evaluation Day 2; ICT Curriculum and Teacher Competency & Workshop Evaluation Day 3.
Workshop Proceedings

Day 1

1.1 Opening remarks

The workshop was opened with a prayer by the Reverend Emmanuel K. Dadebo.

The opening remarks were made by Mr. Richmond Atta-Williams, Coordinator of the Activity Project who outlined the objectives, scope and time frame of the project. Mr. Williams described the focus of the project for bringing connectivity to 50% of Senior High Schools (SHS) (200 schools) in a 1st phase of the project and in a later phase to extend connectivity to all SHS. Mr. Williams described the dynamic value of the public-private partnership alliance between MoE, GESCI, USAID and Vodafone as a solution for achieving the common goal to provide internet access to all SHS schools.

Mr. Williams clarified the project thrust for creating an ICT innovative platform to improving access, student achievement and transformation of teaching and learning by way of increasing ICT resources and enhancing communication skills. He reflected on the role of ICT in the Knowledge Age and the expectation of transformation of novice learners into experts in their field of study – from passive participants to active creators and builders of knowledge. These parameters made it necessary to integrate the workshop themes of ICT curriculum review and ICT teaching & learning competencies as critical components of the project development.

1.2 Introductions/ Setting the scene

Following the opening remarks Ms. Esther Mwiyeria invited workshop participants to introduce themselves and to present their hopes and fears for the workshop process and the connectivity project. In a broad brush participant expectations and concerns were categorized around six elements of system implementation of the connectivity project, namely expectations and concerns related to 1) ICT & policy, 2) ICT & curriculum, 3) ICT & pedagogy 4) ICT & Infrastructure, 5) ICT & organizational management and 6) ICT & professional development. A summary of expectations & concerns in these six categories is presented in Table 1.

Table 1: Overview of Participant Expectations & Concerns for the Connectivity project and Workshop Processes

<table>
<thead>
<tr>
<th>Connectivity Project System Overview</th>
<th>Expectations Participants have hopes about...</th>
<th>Concerns Participants have concerns about...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy</td>
<td>• Know what exactly is ICT integration – what answers teachers in Ghana can tap into to do integration in classrooms</td>
<td>• How can this project reach those in the rural areas who lack more physical infrastructure particularly for chemistry • Unsustainability of the project – • The project might be a one day wonder and will not be able to continue – we hope with it in the hands of the GES that it is going to continue</td>
</tr>
<tr>
<td>Connectivity Project</td>
<td>Expectations</td>
<td>Concerns</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>System Overview</td>
<td>Participants have hopes about…</td>
<td>Participants have concerns about…</td>
</tr>
<tr>
<td></td>
<td>• Ability to incorporate ICT in the teaching of Biology to enhance better learning outcomes</td>
<td>• If we come out with something – who will implement this</td>
</tr>
<tr>
<td></td>
<td>• Using ICT to promote the teaching and learning of the English Language regarding all aspects of English We will fulfil the objectives of the workshop</td>
<td>• Opportunities to learn new ideas</td>
</tr>
<tr>
<td></td>
<td>• To know what is involved in integrating ICT into the GES Curriculum to achieve the skills in thinking levels in the Blooms Digital Taxonomy.</td>
<td>• How ICT is applied in teaching children to read the various cognitive levels in the Blooms Taxonomy</td>
</tr>
<tr>
<td></td>
<td>• Understand digitized curriculum and the process of digitizing content</td>
<td>• How can ICT be accessed in the packed WAEC examinations at the Senior High School Level</td>
</tr>
<tr>
<td>Curriculum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedagogy</td>
<td>• Sharing ideas on learning and teaching</td>
<td>• No clarity of how ICT is to improve teaching and learning</td>
</tr>
<tr>
<td></td>
<td>• Integration of ICT into teaching and learning of Physics &amp; Integrated Science;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Acquire information on new ways by which ICT can be implemented in the propagation of relevant subject matter (Eng Language) towards achieving academic excellence</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• I expect to get in-depth knowledge of ICT to teach Maths effectively</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• To know exactly things that I need to integrate ICT in my teaching and learning</td>
<td></td>
</tr>
<tr>
<td>ICT Infrastructure</td>
<td>• To know exactly things that I need to investigate to integrate ICT in my teaching and learning</td>
<td>• Establishing a concrete link between the use of the internet in acquiring information and ensuring that the new knowledge acquired is shared by virtue of communication</td>
</tr>
<tr>
<td></td>
<td>• I expect to get the knowledge of ICT to teach effectively</td>
<td>• ICT equipment that would be available for teaching and orals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• We do not have enough materials in our schools – e.g. computers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• I need the necessary TLMs to teach Maths effectively</td>
</tr>
<tr>
<td>Organization &amp; Management</td>
<td>• Improvisation of Resources</td>
<td>• We might not have enough time to discuss everything</td>
</tr>
<tr>
<td></td>
<td>• Identify challenging topics in Maths where ICTs can be used to simplify for students</td>
<td>• In what way can we make what we have easily accessible to students and teachers</td>
</tr>
<tr>
<td>Professional Development</td>
<td>• Teacher Education Division to come out with a workable framework</td>
<td>• No teacher training in this area – small enclaves of training – INTEL</td>
</tr>
<tr>
<td></td>
<td>• TED – teacher Professional Development through INSETs</td>
<td>• Not clear about the focus of this workshop</td>
</tr>
</tbody>
</table>

See an overview of participant *expectations and concerns* in workshop presentation summary in appendix 3.
1.3 Day 1 Presentations, Group Work & Plenary Discussions

Over the four days of workshop presentations were provided by way of input into the project ICT curriculum review and teacher competency and development processes.

The following presentations were provided:
1. Overview of ICT Integration in Senior High Schools in Ghana
2. The Future of Education
3. Twenty-First Century Skills and the Pivotal Role of ICTs and Learning in the Knowledge Age
4. ICT Teacher Development Matrix
5. Report of the pedagogical Scan – ICT Use in T&L In SHS
6. Global Trends Shaping Education and Teacher Development
7. Contextualizing ICT Competencies for Teachers in Ghana
8. TPACK in Ghana
9. Operationalizing ICT Teacher Competencies – TPACK

An overview of workshop presentations can be accessed in appendix 3.

1.3.1 Presentation – Overview of ICT Integration in Senior High Schools

After the introductions were concluded, Ms. Felecia Boakye, Deputy Director of the Curriculum and Research Development Division of GES, provided an overview on the status of ICT integration in Senior High Schools in Ghana and the landscape of ICT integration in national regional and international contexts. Ms. Boakye described the SHS curriculum as comprising of 57 elective subjects and 5 core subject areas and having general, academic and trade/ vocational educational streams. She clarified the SHS cohort of 16-19 year old students as constituting the terminal education for entry into the world of work and entry point for tertiary education.

Ms Boakye explored definitions and levels for ICT integration form basic scenarios to proficient scenarios. She reflected on the next generation of ICT users inclusive of the even the very young toddlers still languishing in the spirit world as digital natives already. She explored issues of human capital theory and the challenge of education systems to respond to the needs of the economy and society. Ms. Boakye explored the focus of education systems for youth development from different parts of the world form the USA – focus on citizens and workers to UK focus on practical problem solving to the Korea focus on SMART Education.

Ms. Boakye described the Ghana focus of ICT in Education as embedded in the ICT in Education policy 2008 solidly drafted and the ESP 2010 – 2020 emphasis on the use of ICT as a tool to improve quality. She pointed to the implications for Curriculum Development requiring syllabuses to incorporate ICT into the core curriculum, infuse ICT in subject areas, use digitized content to teach and use the internet search to gather information about topics. Ms. Boakye concluded by describing the achievements most notably the integration of ICT integration in the curriculum as a core and elective subject and the training of teachers to implement the revised syllabuses. She summarized some of the challenges and opportunities ahead with the integration of ICT in school systems not least of which is the conflicting evidence of return of investment in terms of the impact of ICT for transforming teaching and learning.
1.3.2 Panel Discussion – ICT in Education in Ghana – Issues and Opportunities

The panel discussion focused on questions related to the importance of ICT in Education and the status of ICT integration in the SHS curriculum. The panel members were the Reverent Emmanuel Dadebo (Teacher Education), Ms. Felecia Boake (CRDD), Mr. Isaac Asiegha (CRDD), Ms. Ama Banini (CRDD) and Mr. Nanu Adu (teacher SHS).

The main questions presented and discussion points around these are summarized in Table 2

Table 2 – Summary of Panel & Open Discussion Summary on the status of ICT in Education in Ghana

<table>
<thead>
<tr>
<th>Questions</th>
<th>Panel Discussions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opening question:</td>
<td>• Key elements of ICT integration are knowledge and skills for living in the world today</td>
</tr>
<tr>
<td>What is the importance of ICT integration in schooling?</td>
<td>• Traditional education &amp; teaching pedagogies cannot meet the needs to advance the frontiers of knowledge and human development in a knowledge economy and society</td>
</tr>
<tr>
<td>What is it that ICT can do and what can it not do?</td>
<td>• The importance of ICT in schools is in no doubt - students need these skills to cope with the world of work. Critical skills come with other competencies – technical, non-technical and cognitive skills</td>
</tr>
<tr>
<td>Can ICT make up for poor policies/ poor lessons?</td>
<td>• Youth have more knowledge than what is in the syllabuses</td>
</tr>
<tr>
<td></td>
<td>• Education is the best of culture – what is said – the way we do things – the best way of doing things now is with technology. Once education is the place of culture – whatever is in Society now should be incorporated into education.</td>
</tr>
<tr>
<td></td>
<td>• In schools – the reality is that teachers need to direct students on the main focus of how to use ICT positively – students are using technology without the direction of teachers and sometimes not in a positive way</td>
</tr>
</tbody>
</table>

Questions from the floor:
• Looking at the ICT syllabuses – in JHS they are very comprehensive – but students come to SHS without understanding – what are the panels views on this?
• What are the panel’s comments on projects where laptops were given to students who don’t know how to use them?
• How to address the lack of adequate tools/ peripheries to use the information access on the internet?
• Resources are limited – but creativity is unlimited. Teachers need to take initiatives – and they should own their personal laptop in the same way as owning a mobile phone, food and clothes. There is also a need to exploit the resources in the community – solar power/ batteries – doing networks to support government policy. There is not the capacity in the government to resource every school.
• The issue at the heart of ICT integration is the pedagogy – what pedagogy is the teacher going to use? Example given of teaching sanitation in class 6 - turning the topic into a project – integrating new technologies of movie-maker and mobile phone - giving guidelines as to what the children should do inside and outside the classroom.
• Critical issues coming out – resources at school level, pedagogy, creativity and time – does the curriculum allow for that flexibility – dose it allow for project based learning? Does it mean that there is a need to cut down on curriculum content? Teacher direction and facilitation are the critical elements to be addressed.
• The teacher’s own initiative is also critical – learning and sharing knowledge and skills.
• The issue of ICT integration is a process – all of the tools are characteristics of integration – for different levels in our system. So the requirement is to teach the basic skills and let teachers take it from there.
• There is a need for policy review on the use of mobiles in SHS given the rationale for integrating the use of mobile phones in schools.
• Regarding resources in study visits to Korea they used books/ drawings of computers to start up where the schools get the tools later.
1.3.3 Presentation – Global Trends and Frameworks Shaping Curriculum Renewal and Innovation

Dr. Patti Swarts provided an overview of global trends, models and frameworks influencing and shaping education development and in turn have an impact on and consequences for curriculum renewal and innovation. The global trends include among others borderless education, increased creativity, global mobility and expansion of technology. She presented a short video on what a classroom of the future could look like - with technology enhanced project-based learning taking place where the students acted active participants, problem-solvers and co-creators of knowledge and the teacher as facilitator of learning. She mentioned the characteristics of the digital generation and what the implications are for curriculum renewal. She emphasized that a paradigm shift was required in education and that teacher education must enable this shift and fuel the digital revolution.

In the interactive discussion following the presentations, participants presented a number of key reflections on Trends shaping Education in Ghana, as summarized in Table 3:

<table>
<thead>
<tr>
<th>Participant Questions</th>
<th>Reflections</th>
</tr>
</thead>
<tbody>
<tr>
<td>How can new pedagogies be carried out in classrooms without sophisticated digital resources demonstrated in the video for project based learning on building bridges?</td>
<td>The technologies can mix traditional with the new – as in the use of local materials to build bridges – bringing in experts from the local area who have been using these materials and then compiling the project work using online applications of word, presentation software, video creation software etc.</td>
</tr>
<tr>
<td>What do the youth say about their expectations?</td>
<td>Policy makers and people in head office do not listen to youth and the youth are most affected on a daily basis of the decisions they make - see <a href="http://voicesofyouth.org">http://voicesofyouth.org</a></td>
</tr>
</tbody>
</table>
| Some research is showing that you can integrate technology into classrooms that are not overcrowded – how can you integrate in classrooms where there are large classes – in 60 – 80 classes? | • Part of the approach is to also look at pedagogies to support large classes – and under-resourced classes  
• Part of the solution is to look at blended learning facilities to help the students – the teacher can divide the class into different groups and organize different tasks  
• A well trained teacher who can organize the classroom – teacher education is the key |
| Some countries attract the best of students into teaching - how to cope when the teacher intake is not up to standard? | • There is a need to look at policy for attracting teachers into education – the highest performing countries have teachers who are highly qualified and well paid (Finland and Singapore) |
| Is using a PowerPoint presentation the epitome of ICT integration? | • There is also the need to understand ICT interactive tools/ pictures/ animations  
• Whichever method one uses as a means of integrating technology in teaching and learning – can never be the epitome – there is always a better level – whatever level you are at – as you become better you will become more interactive  
• There is also a need to ask where we are and use what we have – while we are putting in place what we are working towards.  
• Discussing about You tube – everything that you need to learn is on You Tube – when you go there – all aspects are there – helping the teacher equip himself for the classroom  
• Teachers need to be trained to know how to integrate and what they need to integrate in their own practice |
Much of the problem is policy makers is that most of them were born before computers – many refuse to learn. How as implementers do we get policy makers to be on the same page – when it comes to integrating ICT? How do we move the agenda forward – can we only move forward when policy makers are on our side?

- Policy makers seem to want to hand-over computers into schools...
- Technology does present a threat to higher level politics – as was seen with the Arab Spring – as technology can enable movements against the status quo
- Technology is costly and brings its own issues when integrated...
- When there is no examination impetus in SHS and ICT is made examinable – the interest of stakeholders will be greater
- The mind-set of subjects begin exam-based – looking at the issue of skills – doing things with exams and coming out with products – e-portfolios will address skills demonstration – open days for parents to see what they are doing –
- ICT should be used to assist students to learn with greater facility to learn their subject areas
- Students that seem to be dis-interested in learning – is also about understanding their issues
- As we try to integrate ICT across subject areas – all students will be interested
- Trying to arouse students interest in ICT can start with email accounts – where teacher gives different assignments in email account
- There are practical assessments that can attract the collective interest of all students
- The focus should be on all teachers – not specialist teachers – for ICT integration to becomes a whole school initiative – an initiative across all subjects

**Skills assessment**

- What are people selling? What are the skills that people have?
- Discussion on work skills for the workplace – inclusive of work ethic skills?

**Priorities**

- Assessment – and how to assess these creative skills
- Project based learning where attitudes and values can be met
- Strong collaboration between ICT teachers and subject areas
- Application of ICT skills across subject areas
- Collaboration between teachers – possible and linked with projects in school-based assessment – projects involved in other subject areas
- Teacher training – pre-service and in-service should be linked to the curriculum priorities
- Review of ICT in Education research to support policies
- Content - identify the priority content and skills for every subject - digitization of resources appropriate to content
- Alternative models for ICT Infrastructure
- Strategies that could be adopted

**NEETs - not in employment, in education, in training**

- What needs to be assessed are the skills gained as a result of using ICT
- The assessment system in Ghana is far behind ICT and is causing problems in terms of security of examinations – use of mobile phone interfering in the examination process – fighting the use of technology as opposed to integration...
- How to give credit for the work ethic in the school system is a challenge

### 1.3.4 Group Work – Examining subject curricula documentation form other countries

In the group work which followed the presentation and discussions participants were asked to review syllabuses form different countries and compare and contrast them with the Ghana Syllabus. Participants were oriented to examine the types of ICT used in the syllabuses, how the ICTs are been used, the types
of learning methodologies indicated to facilitate ICT Integration and whether it was possible to identify 21st Century skills advocated in the syllabuses.2

Table 4 presents a summary of the main discussion points following the presentations of the curriculum reviews on ICT use.

Table 4 – Summary of Group Discussion on Review of Country Syllabuses

<table>
<thead>
<tr>
<th>Group Curriculum Reviews</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group – Review of Namibia</td>
<td>Comments: There is a form of integration – because ICTs cut across all of the curriculum subjects. Brainstorming, strategies – are methodologies – tools are word and spreadsheet. The approach that we use to teach skills and knowledge.</td>
</tr>
<tr>
<td>Review of Ghanaian / El Salvadorean - English Syllabus</td>
<td>Comments: General impression - ICT in teaching is more evident in the Ghanaian syllabus than on the Salvadorian syllabus.</td>
</tr>
<tr>
<td>Review of Ghanaian Syllabus/ Ontario – Science</td>
<td>Comments – 21st Century skills are in the preamble of the Ghana syllabus – not integrated into the syllabus.</td>
</tr>
<tr>
<td>Review of Singapore Syllabus</td>
<td>Comments: No particular mention of the ICT use for Mathematics topics. A lot of focus on the 21st Century skills. Framework developed in content, skills and processes – probably the technology is integrated into processes. General impression – left the use of ICT solely to the expression of the teacher.</td>
</tr>
</tbody>
</table>

1.4 Organization of Day 1 Recap and Evaluation

Day 1 was concluded with the volunteering of participants to be the ‘Eyes’ and ‘Ears’ of the workshop processes. The participant volunteers would provide a recap of the day 1, 2 and 3 processes from aural and visual perspectives.

Participants were also requested to access and complete a survey monkey evaluation of day 1.

2 Links to the group work feedback on review of syllabuse form around the world can be accessed in appendix 4.
Day 2

2.1 Recap and Evaluations of Day 1

2.1.1 Eyes and Ears feedback

The ‘Eyes and Ears’ sessions were presented by volunteer participants who summarized the sessions of the first day of workshops from auditory (ears) and visual (eyes) perspectives.

2.1.2 Workshop Evaluation – Day 1

Ms. Mary hooker presented an overview of participant workshop evaluations completed online after the first day of workshop. Participants expressed general satisfaction with the quality of workshop content and facilitation. Key learning points for participants included the review of the syllabuses of different countries and the discussions around the relevance of ICT integration. Areas for improvement identified by participants included time management in general with specific reference to a need for more time in both discussions around the presentations and plenary sessions following the group work.

An overview of day 1 evaluation can be accessed in appendix 8.

2.2 Day 2 Presentations, Group Work & Plenary Discussions

2.2.1 Presentation – Introduction of Curriculum Mapping Process and Template Stage 1

In introducing the curriculum mapping process, Dr Patti Swarts explained that curriculum renewal is a continuous process to ensure quality and relevance of learning programmes and that many tools and practices regularly used by teachers can be used to inform curriculum review and renewal. The focus of the review in the Ghana case would be on learning with and learning through ICT to enhance the teaching and learning in Science, Mathematics and English in Senior High Schools. For this purpose a curriculum mapping template was to be used to situate learning with and learning through ICTs in the larger curriculum landscape of Senior High Schools in Ghana, and to identify the connections with other subjects and the overall learning outcomes for a richer learning experience. The process and template to be used required participants to look at overall curriculum goals, priorities, learning outcomes, assessment practices and teacher preparation in relation to how these could be enhanced or improved with ICT integration.
2.2.2 Group Work – Use of curriculum mapping template to examine general parameters of ICT integration in the Ghana Curriculum

Participants were provided in their subject groups with the curriculum mapping templates and the draft Ghana curriculum framework and were oriented to examine the goals, priorities, learning outcomes, etc. while discussing and reflecting on how these could be enhanced with technology use and ICT integration to ensure an enhanced learning experience for students. Subject groups provided examples of and feedback on curriculum enhancement related to their respective subjects.3

Groups presented the task on mapping the general parameters of ICT integration in the Ghana mapping exercise.

Table 5 – Summary of Plenary Discussion on General Curriculum Mapping

<table>
<thead>
<tr>
<th>Group</th>
<th>Mapping Review General Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science Group</td>
<td>ICT Skills</td>
</tr>
<tr>
<td></td>
<td>• ICT skills is mentioned widely but no mention of ICT in relation to science teaching</td>
</tr>
<tr>
<td>Science Content</td>
<td>• ICT is widely dealt with as a subject</td>
</tr>
<tr>
<td></td>
<td>• Application in the objectives has not yet been done in the teaching and learning of science</td>
</tr>
<tr>
<td></td>
<td>• ICT use in teaching and evaluation is lacking</td>
</tr>
<tr>
<td>Teacher preparation</td>
<td>• There is mention of ICT in the use of videos</td>
</tr>
<tr>
<td>Mathematics Group</td>
<td>• Not able to come up with what should be done to improve the curriculum for ICT Integration</td>
</tr>
<tr>
<td></td>
<td>• No link of assessment to ICT</td>
</tr>
<tr>
<td></td>
<td>• FBA?? should be adopted and teacher preparation there is no mention of ICT</td>
</tr>
<tr>
<td></td>
<td>• There are references in the general aims and objectives (use of calculator)</td>
</tr>
<tr>
<td></td>
<td>• Stated the type of ICT to be used and how it should be used (use of the calculator)</td>
</tr>
<tr>
<td></td>
<td>• Learning outcomes – stated how students should use ICT to achieve outcomes</td>
</tr>
<tr>
<td></td>
<td>• Assessment practices – there is also mention of ICT</td>
</tr>
<tr>
<td>ICT Group</td>
<td>• In the curriculum ICT is identified as a critical components for life-long learning</td>
</tr>
<tr>
<td></td>
<td>• ICT is considered as a tool for communication and collaboration</td>
</tr>
<tr>
<td></td>
<td>• ICT is an enabler in the achievement of learning outcomes</td>
</tr>
<tr>
<td></td>
<td>• Communication is seen as one of the core skills for life as noted under the list provided in 21st Century skills</td>
</tr>
<tr>
<td></td>
<td>• Communication is seen in many forms – images, videos, verbal,</td>
</tr>
<tr>
<td></td>
<td>• Communications skills – talk fluently, write, explain, discuss, demonstrate etc. These are general skills and core skills that run across board.</td>
</tr>
<tr>
<td>English Group</td>
<td>• Students competencies have been identified in the framework</td>
</tr>
<tr>
<td></td>
<td>• Teachers competencies are embedded in the methodologies</td>
</tr>
<tr>
<td></td>
<td>• ICT has been referenced through recording tapes and watching and listening to speech in radio and television and online articles</td>
</tr>
<tr>
<td></td>
<td>• Teacher will have to be proactive in identifying areas where ICT could be used to enhance the teaching of English</td>
</tr>
<tr>
<td></td>
<td>• The ball goes back to teacher education and teacher preparation so that they have good</td>
</tr>
</tbody>
</table>

3 Links to the group work task & feedback on mapping ICT in the SHS Curriculum can be accessed in appendix 5
competencies to identify opportunities for ICT use in their teaching

- Are there competencies that have been identified when dealing with oral reading both for teachers and students? This has been taken care of in recorded speeches through use of cassettes and television

Conclusions

- We have to keep everything in focus of the workshop objectives. The main objective is to provide examples of ICT integrated topics in the curriculum framework and in the syllabus
- Life skill or essential skills (CRDD will have to decide which skills should be focused on).
- Not every topic lends itself to ICT Integration
- Identify topics where ICT Integration is necessary
- Curriculum review for ICT Integration will have implication on teacher preparation for pre-service and in-service training.
- Role, place of ICT in the domains, area where ICT has been identified and gaps where ICT has been excluded and could be included

2.2.3 Presentation – ICT-Teacher Professional Development Path Matrix

Ms. Mary Hooker made a presentation on the theme of an ICT Integration Matrix – A Conceptual Framework. The presentation looked briefly at three studies on ICT integration in education systems from an international study conducted by GESCI (2009) that consisted of a meta-review on ICT in Education, to a regional study conducted by UNESCO-IICBA (2008, cited in Temechegn 2012) on a needs assessment for ICT standards for African teachers to a country study conducted by Banini (2012) on the status of ICT integration in a primary school project.4

Findings in the studies showed that many countries have addressed ICT infrastructure issues and had also introduced ICT curriculum standards. However, few had addressed ICT pedagogy issues or were even aware of work in this area. Studies of teaching and learning around the world identify four broad stages in the way that teachers and students learn about and gain confidence in the use of ICT. These four stage can be described as a continuum or series of steps, namely: Emerging, Applying, Infusing, and Transforming. The stages can be aligned to teacher and student competency for discovering about ICT (emerging stage), learning how to use ICT tools in classroom practice (applying), understanding how and when to use ICT in curriculum subjects (infusing stage) and integrating ICT for transformative practices in teaching and learning (transformation stage).

All studies identified a landscape of different levels of ICT integration in education systems and the requirements for transformed practice to enable ICT effective integration.

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In the discussion following the presentation, participants reflected on the status of ICT integration in Ghana:

Table 6 – Summary of Plenary Discussion on Status and Scope for ICT Integration in Ghana

<table>
<thead>
<tr>
<th>Participant Questions</th>
<th>Reflections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where are we now? Where do we want to be?</td>
<td>Status and scope for ICT integration – ICT Knowledge &amp; Skills – current level</td>
</tr>
<tr>
<td></td>
<td>• Basic skills level with teachers using ICT for wordprocessing, PowerPoint presentation, internet searching etc.</td>
</tr>
<tr>
<td></td>
<td>ICT knowledge &amp; Skills – development continuum</td>
</tr>
<tr>
<td></td>
<td>• Essential skills for ICT use transformative practice – for developing cognitive, technical and non-technical skills in the areas of collaboration, critical skills, problems solving, higher order-thinking etc.</td>
</tr>
<tr>
<td>Instructional approaches for ICT Integration – current level</td>
<td>• Teacher centered approaches, lecture, rote learning etc</td>
</tr>
<tr>
<td></td>
<td>• Content teacher centered</td>
</tr>
<tr>
<td></td>
<td>• Students teacher centered</td>
</tr>
<tr>
<td>Instructional approaches – development continuum</td>
<td>• Student centered approaches, problem centered, using ICT in teaching and learning</td>
</tr>
<tr>
<td></td>
<td>• Learner centered approach discussion role playing etc</td>
</tr>
<tr>
<td>Where are teachers at in Ghana in relation to ICT integration in their school practice?</td>
<td>English Teacher</td>
</tr>
<tr>
<td></td>
<td>• All the students have a gmail account</td>
</tr>
<tr>
<td></td>
<td>• Teacher sends a question to students (essay) questions</td>
</tr>
<tr>
<td></td>
<td>• The students send back the assignment</td>
</tr>
<tr>
<td></td>
<td>• The challenge is the large class sizes</td>
</tr>
<tr>
<td></td>
<td>• Where do the students access their gmail accounts? – in the school lab</td>
</tr>
<tr>
<td></td>
<td>• What ICT’s are in school – the ICT lab has 50 computers with flat screens, projectors, internet access</td>
</tr>
<tr>
<td></td>
<td>• For each class two students use one computer. Students access the lab once or twice a week</td>
</tr>
<tr>
<td>ICT teacher</td>
<td>• One complete lab and no internet</td>
</tr>
<tr>
<td></td>
<td>• Teachers use own modems to access internet</td>
</tr>
<tr>
<td></td>
<td>• Most of the teachers are not familiar with the gadgets</td>
</tr>
<tr>
<td></td>
<td>• ICT department started teaching teachers and a number of them can now do abit of computing.</td>
</tr>
<tr>
<td></td>
<td>• Students have skills but these skills are limited as they access the labs for only 1 hour in a week</td>
</tr>
<tr>
<td></td>
<td>• Timetable has not been referenced and given enough time. This reference has been given in the preamble of the syllabus and this makes it a policy (Felicia). But exams take a lot of students time and as such they will not go to the lab often when the exams are about to be done because it is considered a waste of time.</td>
</tr>
<tr>
<td></td>
<td>• Should ICT not be used during the revision period to provide opportunities for making difficult subjects easier to learn through ICT?</td>
</tr>
<tr>
<td>Biology teacher</td>
<td>• Even though there is a lack of computers and they might not have enough, (80 students in a class and 20 computers), we have made them understand that ICT is integral in their lives. The computer is not seen in isolation but as part of the whole.</td>
</tr>
<tr>
<td></td>
<td>• After-school programmes can also be planned for so that ICT can be carried out of the busy timetable. In day-schools, when parents find the programme beneficial they will buy into it. Once parents and administration get interested, parents will be ready to invest.</td>
</tr>
<tr>
<td></td>
<td>• ICTs is not just the computers but it should also be other technologies like TVs and radios</td>
</tr>
<tr>
<td>Participant Questions</td>
<td>Reflections</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>• Policies should exist at national and school levels and as seen in other countries.</td>
<td></td>
</tr>
<tr>
<td><strong>ICT teacher</strong></td>
<td></td>
</tr>
<tr>
<td>• ICT teacher should also educate the subject teachers on how ICT can benefit them in their subject teaching</td>
<td></td>
</tr>
<tr>
<td>• Orientation/sensitization, ICT champions and sharing materials are all strategies for ICT integration</td>
<td></td>
</tr>
<tr>
<td>• In their school the printer is in Headmistress’ office</td>
<td></td>
</tr>
<tr>
<td>• It is difficult to access certain accessories for teaching, eg internet, projects and printers as because of their location</td>
<td></td>
</tr>
<tr>
<td><strong>Recommendations of Administration support</strong></td>
<td></td>
</tr>
<tr>
<td>• Funds for buying materials are not easily provided</td>
<td></td>
</tr>
<tr>
<td>• Most of the problems are financially related</td>
<td></td>
</tr>
<tr>
<td><strong>Is there a budget of ICT use in the school?</strong></td>
<td></td>
</tr>
<tr>
<td>• There is a fee for ICT, science resource centers, funds have been provided through the ICT collected at school level</td>
<td></td>
</tr>
<tr>
<td><strong>Is that budget audited to ensure that the money is used as it should?</strong></td>
<td></td>
</tr>
<tr>
<td>• This will be handled later on by GES as there are some plans on the ground (Rev)</td>
<td></td>
</tr>
<tr>
<td><strong>What will be the scope for ICT integration in teaching and learning?</strong></td>
<td></td>
</tr>
<tr>
<td>• Teachers have not reached the transformational level</td>
<td></td>
</tr>
<tr>
<td>• At what stage are teachers at? – we are emerging stages as awareness is being raised – CRDD</td>
<td></td>
</tr>
<tr>
<td>• Teachers are plagued down by attitudes – Teachers</td>
<td></td>
</tr>
<tr>
<td>• Teachers would like to look out for all the levels of learning with and through ICT</td>
<td></td>
</tr>
<tr>
<td>• Teachers are at teacher’s learning about ICT</td>
<td></td>
</tr>
<tr>
<td><strong>What level of ICT integration in the curriculum will be targeted?</strong></td>
<td></td>
</tr>
<tr>
<td>• The curriculum should be aimed at the highest level.</td>
<td></td>
</tr>
<tr>
<td>• The aspiration in the curriculum will be twinned with the aspiration in the teacher development</td>
<td></td>
</tr>
</tbody>
</table>

### 2.2.4 Presentation – Introduction of Curriculum Mapping Process and Template Stage 2

As a next step in the curriculum review process, the subject groups were required to do a subject syllabus audit to identify potential areas and topics for ICT integration, and to give an indication of how ICTs could be used, what technologies would be required, and how teachers would have to be prepared for it. Dr. Patti Swarts stressed that a carefully planned, clearly written, comprehensive syllabus is a most important resource for teaching and that a well-designed syllabus performs many functions for the teacher and for the student: it outlines course expectations, organizes information, sets the tone for class interactions, and guides student learning.

The groups received as examples subject syllabuses from other countries where ICTs had been integrated to give them an idea of how other countries dealt with ICT integration and what types of ICTs were used. Subject syllabus examples were drawn from Namibia, Ontario, Singapore, South Africa and El Salvador.
2.2.5 Group Work – Use of curriculum mapping template to examine specific parameters of ICT integration in the Subject Areas

The subject groups were given a subject syllabus review template to systematically review learning priorities and outcomes, to identify topics lending themselves to ICT integration and what learning with and learning through possibilities are already in the syllabuses. They also had to identify suitable ICT tools, the methodologies most appropriate when ICT tools are used and what special needs students might require. They were requested to review these in relation to ICT core competencies and skills required, what assessment practices would facilitate and support those and how teachers would have to be prepared to effectively deal with ICT integration in their respective subject areas.

Groups presented the task on mapping the specific parameters of ICT integration in the different subject areas.5

2.3 Organization of Day 2 Evaluation

Participants were requested to access and complete a survey monkey evaluation of day 2.

5 Links to group work feedback on mapping ICT use in Mathematics, English and Integrated Science Syllabuses can be accessed in appendix 5.
Day 3

3.1 Recap and Evaluations of Day 2

3.1.1 Eyes and Ears feedback

The ‘Eyes and Ears’ sessions were presented by volunteer participants who summarized the sessions of the first day of workshops from auditory (ears) and visual (eyes) perspectives.

3.1.2 Workshop Evaluation – Day 2

Ms. Mary Hooker presented an overview of participant workshop evaluations completed online after the second day of the workshop. Once again participants expressed general satisfaction with the quality of workshop content and facilitation. Key learning points for participants were spread across various aspects of the workshop processes from the review of the curriculum with a focus on the ICT tool to the ICT development path matrix to the mapping of ICT in subject content. Areas for improvement ranged from time management to the needs for more time for group work to the need for more handouts for groups work processes.

An overview of day 2 evaluation can be accessed in appendix 8.

3.2 Day 2 Presentations, Group Work & Plenary Discussions

3.2.1 The Schools Survey on the Pedagogical Integration of ICT

Ms. Esther Wachira, presented a pedagogical survey report that was carried out in a sample of 40 schools out of the 400 schools to be covered by the connectivity project in September 2012. The presentation outlined the objectives of the project, the methodologies and instruments used in the survey (desk review, online survey interviews and focus group discussions), the analysis of findings, conclusions and recommendations.

Ms. Wachira clarified that the pedagogical survey reports was a draft report. The survey builds on the 2009 baseline survey of ICT use in SHS conducted by GES in 2009. The survey will also include a component on ICT infrastructure that will be added later. The purpose of the presentation in the workshop was to present and validate the current status of the pedagogical use of ICT in SHS schools. Copies of the reports had been distributed to workshop participants for review.

Some of the feedback from the workshop participants was presented in written response to the report while the following summary in Table 7 presents some of the participant general comments and critique of the report shared following the presentation:
Table 7 – Participant Discussion of the Pedagogical Survey Report

General Comments on the Report
- The baseline survey that was conducted in 2009 covered 95% of all SHS schools – at the time there were some 455 SHS schools. In the pedagogical survey out of 400 schools – only 40 schools are covered.
- Why does the report focus on recommendations for the pedagogical integration of ICT in Mathematics, English and Science subjects only – why not provide an opportunity to build capacity for ICT integration cross all subject?
- The report signals dissatisfaction with the use of ICT fees – and this is an aspect that needs consideration even though schools are accountable to the MoE on the use of the fees.
- The ICT lab model is presenting challenges for adequate access and relevance – as students and teachers can access mobile technologies with ease outside the school environment. Nevertheless the policy is that students are not allowed to use mobile phone gadgets in the schools – so it is not clear how a mobile policy can be implemented.
- Teachers have indicated in the report that ICT does not have an impetus because it is not examinable.
- At school level the report identifies gaps in policy. We are not very good at formulating policies at school level – there should be a general assistance to help development of school based policies.

General Issues and Challenges with the Report
- While there are a number of very important findings which came up in the report are very true – the report has not been fair in some areas.
- It is strange to hear that ICT policy has not been endorsed in schools as there are clear linkages to national strategic plans for ICT integration and implementation.
- The issue of integration in Universities is not representative as they have policies for ICT integration.
- The issue of the schools is also not representative – as the syllabus indicates the number of hours for use which puts pressure on the lab.
- The issue of ICT in education policy not having been endorsed from the reforms is also questionable. The policy is that ICT should be introduced in the subject and as a tool to enhance teaching and learning across other subjects – the work of CRDD is to implement that policy.
- A recommendation for a core group to sit down and shape the report to reflect the correct picture. Some of the development on ICT integrations is not adequately reflected in the report.

Comparison with other studies
- Very happy with the report – the findings seem to conform with an earlier report conducted across five countries.
- We have always been confusing ICT integration with deployment. Deployment should be quickly followed with ICT integration in the curriculum.
- Deployment of infrastructure is not the issue- the school has to have its own policy that will address the national objectives for ICT use.
- Having access is not the same as accessibility – it needs to take into account the contextual – socio-economic issue – pedagogical issues – and leadership is not interested – and this is why policy will always break down at school level.

Issues of Policy and Implementation
- Can see where the issues are for a policy maker – and see that it is not holding.
- National ICT Policies are difficult to understand – implementable policies will be associated with an implementation plan – is there any implementation policy and plan for ICT integration in education?
- The national agencies are not able to implement – officers don’t have the skills to implement.
- Recommendation – calm down and go through the policy and delete elements that are not usable.
- There is a difference between national policy and school-based policy – as every school needs to develop their own policy that works for the practice.

Some responses to the issues raised on the pedagogical survey:

On the survey scope
- The 2012 pedagogical survey was based on objectives of the connectivity project – which required a snapshot to complement the findings of 2009.
- The ICT-readiness component of the survey will cover all schools.
- The pedagogical questionnaire covers 10% of the schools.
On the model for ICT integration
- The model for ICT integration – is a question for further consideration and evaluation. A teacher with a laptop and projector in a classroom across 10 classrooms versus queues I for one lab

On the three subject focus
- The Mathematics, English and Integrated Science focus is based on the focus of this project
- The hope is that the project will have a ripple effect to the other subjects

Recommendations
The report is the first draft – and the policy aspect needs to be looked at again
- There should be a way of helping administrator develop school based policies
- Include the observation that ICT is not an examinable subject does not motivate teachers

3.2.2 Presentation - Trends Shaping Education and Professional Development

Ms. Mary Hooker, was to present an overview on global trends shaping education and professional development. Much of this discussion on trends had already taken place in the curriculum workshop process. The key questions and critical issues for reflection had already been identified in the curriculum workshop as centered on policy implications for future models of learning in relation curricula, pedagogies, assessment, leadership and more specifically to teacher professional development. The ICT teacher workshop skipped the presentation and proceeded to the following session on ICT Teacher Competency Frameworks for Teacher Development.

3.2.3 Presentation - ICT Competency Frameworks for Teacher Development

Ms. Mary Hooker gave a presentation on ICT teacher competency frameworks in general and the opportunities for contextualizing ICT Competencies for Teachers in Ghana (link to presentation on Contextualizing ICT Competencies for teachers in Ghana). She outlined the rationale for an ICT teacher competency framework based on global and regional agendas of Education for All and the challenges for education systems to educate learners to partake in 21st Century Knowledge-based societies and economies.

Ms Hooker introduced a number of international and regional ICT teacher competency frameworks and their characteristics. She then focused on the UNESCO ICT competency framework for teachers (ICT-CFT) that was launched in 2008. The ICT-CFT is the product of a public-private partnership that brought together a panel of international experts and researchers. The ICT-CFT covers breadth, depth and role components that need to be considered for ICT integration in teacher professional development – as in:
- **Breadth** - system elements of ICT integration in course provision in relation to policy, curriculum, infrastructure, organization & management, pedagogy & professional development –
- **Depth** - three approaches to ICT integration in course provision from a technology literacy to a knowledge deepening to a knowledge creation approach
- **Role** - tailoring modules in course provision to develop ICT competencies to cover breadth components and depth approaches for different target groups - such as Trainers of trainers, Lecturers, Instructors, ICT Coordinators, Curriculum Coordinators, Institutional Heads, Teachers.
The competencies can be tailored to a country’s needs, strengths and opportunities for ICT integration. GESCI has developed a roadmap based on the competencies that can be used to contextualize or tailor development paths for ICT use in professional development to a particular country, its policies and its current educational conditions.

3.2.4 Plenary Exercise – Development-Priority Scan of Teacher ICT Competencies in Ghana

After the presentation the participants were given an exercise to identify where they think teachers are in Ghana in relation to their level of ICT competency (emerging, applying, infusing or transforming level) using a Teacher ICT Development assessment tool that was developed by GeSCI. Participants were also asked to prioritize three areas from across the six system competency domains (Policy, Curriculum, Pedagogy, ICT, Organization & Management, Teacher professional development) that should be the focus of ICT teacher development over the next three years.

The summary below presents an overview of the plenary exercise outputs:

- **What is the level of ICT Teacher Competency in Ghana?** Based on the teacher developmental levels identified in the exercise, most of the participants would place ICT Teacher Competency in Ghana between beginning (emergent) and applying (technology literacy) levels of ICT use in classroom practice.

- **What are the priority areas for ICT teacher competency development?** Participants prioritized areas for specific teacher development focus in the next three years in the following competency domains:
  - **Pedagogy** - *planning, problem-based learning, and communication & collaboration* – receiving the highest priority for developing teacher competencies to design classroom activities to engage students in exploring real world issues; to promote, support and model problem solving and knowledge creation; to structure lessons to incorporate multi-media production to support student learning and knowledge sharing & production.
  - **Policy** – *awareness* - for developing teacher competencies to research, evaluate and support school and national policy and vision for ICT integration across all subject areas
  - **ICT** – *internet* - for developing teacher competencies to develop student capacity to critically evaluate the accuracy and usefulness of web resources to support learning goals and strategies
  - **Curriculum** - *curriculum planning and student experience* - for developing teacher competencies to design or adapt classroom activities to incorporate a range of ICT tools to promote student learning; to design relevant learning experiences that incorporate digital tools to promote student research & understanding
  - **Organization & management** - *teacher understanding* - for developing teacher competencies to exhibit a leadership role in creating a vision for technology integration in curriculum and classroom practice
  - **Teacher development** - *teacher awareness* - for developing teacher competencies to participate in local and global learning communities to explore creative applications of technology and share and discuss good practices

- **What do the high priority areas tell us?** This prioritization would represent a participant emphasis on ICT teacher competencies for planning and developing enabling environments with integrated technology for student-centered learning across all curriculum subject areas. This would represent participant ratings for a shift in emphasis for the pedagogical integration of ICT in teaching and learning practices. This priority pattern perhaps signals a movement away from the traditional
teacher-centred didactic approaches of knowledge transmission to learner-centred activity-based approaches that is the focus of education reform in Ghana.

- **What areas received the lowest priority ratings?** There were a few critical areas which received low development and low priority ratings, namely:
  - *Curriculum – Learning environments, Assessment and Special Needs Education* - for developing teacher competencies to identify technology tools for supporting learning environments, to provide students with technology based formative and summative assessment & to use ICT diagnostic tools & assistive technologies to address curriculum objectives for Special Needs Education
  - *Pedagogy – Project-based learning* - for developing teacher competencies to promote Project-based Learning to support student interaction, collaboration & reflection on their own learning
  - *ICT – Communication, Collaboration & Authoring Tools* - for developing teacher competencies to set up authoring tools for promoting student knowledge building & innovation and to use communication & collaboration technologies to locate information, people and resources for developing local and global collaborative projects
  - *Administration – Leading ICT Integration* - for developing teacher competencies to participate in shared decision making for us of ICT in school planning

- **What do the low priority areas tell us?** The low priority areas are somewhat revealing in view of the needs expressed by participants throughout the workshop process to build teacher capacity for new assessment techniques that incorporates technology use, for new pedagogies that integrate project-based learning, for the use of ICT for innovative classroom practice and for the need for school based policy and planning for ICT use that is holistic and participative.

  Participants justified the lack of priority in these areas on the requirement to limit the selection to three top priorities. The resulting priorities offered a more strategic and practical focus for implementing national policy for ICT integration in key subject areas that is focused on the student learning environment and the student experience as critical for improving education delivery.

  Noteworthy also was the low priority ranking by participants for ICT competency domains (*productivity tools, administration, educational software, communication & collaboration*) which received mostly second and third priority rankings. While this was very much a snapshot scan, the patterns nevertheless would challenge assumptions and emphasis in much ICT teacher development programmes (in developed and developing countries) on a techno-centric approach for acquiring ICT technical skills. The patterns would suggest an emerging consensus among policy makers and practitioners that what teachers really need to know and be able to do with technology is to develop their professional capability to both use ICT and apply it in their professional practice.

**Participant comments following the exercise included the following:**

- On policy awareness it seems like teachers and students are not aware that there is a policy for ICT. Whatever the government brings, it becomes like an imposition. When teachers are not aware about policy, then they do not embrace it. Policy awareness would help change attitudes.
- On curriculum planning and pedagogy the priorities should go hand-in-hand. Curriculum is often taken to be somebody else’s work (CRDD). Teachers do not take it that they should be involved in Curriculum planning and development. There is little participation by teachers in curriculum development. This leaves critical gaps as the curriculum alone does not give room for creativity and innovativeness.
• On ICT students are so comfortable with the use of the internet and social networking tools, it is the teachers who need more knowledge in order to support students.

A summary of the plenary findings can be accessed here: Development-Priority Scan Findings (which can be accessed in the overview of workshop presentation in appendix 3)

3.2.5 Review of International, Regional and Country ICT Teacher Competency Frameworks

The plenary exercise and discussion were followed by a group task to review ICT competencies from different countries and to clarify what type of competencies should be developed for teachers in Ghana.

The first part of the group task was to clarify the different formats of teacher competencies that have been developed from international and regional frameworks. A summary of the group discussions is presented in Table 8 below.

Table 8: Review of ICT Teacher Competencies from Different Countries

<table>
<thead>
<tr>
<th>Review Areas</th>
<th>Group Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strengths</td>
<td><strong>International Society for Technology in Education (ISTE) teacher standards</strong>: targets teachers (also have standards for students, ICT coordinators, school leaders and ICT coaches)</td>
</tr>
<tr>
<td></td>
<td>o Focused on competency domains for: student learning &amp; creativity, curriculum for digital age learning experiences &amp; assessments, pedagogy for modeling digital age work &amp; learning, citizenship and responsibility, professional growth &amp; leadership</td>
</tr>
<tr>
<td></td>
<td>o Presentation format is clear and facilitates easy self-assessment</td>
</tr>
<tr>
<td></td>
<td><strong>ICT-Teacher Standards for Africa (ICT-TSA) targets teachers</strong></td>
</tr>
<tr>
<td></td>
<td>o Defines competency domains for: engagement on instructional design processes, for facilitating and inspiring student learning, innovation &amp; creativity, assessment and communication of student learning, professional development and model ethical responsibilities, understand subject matter for use in teaching.</td>
</tr>
<tr>
<td></td>
<td>o has four levels of competency acquisition from emerging to applying to infusing to transforming</td>
</tr>
<tr>
<td></td>
<td>o the framework is easy and simple to follow</td>
</tr>
<tr>
<td></td>
<td><strong>ICT Standards Framework for teachers in South Africa</strong> targets teachers</td>
</tr>
<tr>
<td></td>
<td>o Address competency domains for ICT Professional Aptitude; Integration of ICT in the curriculum; Management &amp; Innovation.</td>
</tr>
<tr>
<td></td>
<td>o has five levels of competency acquisition from entry level, to adoption level to adaptation level to innovation level to appropriation level.</td>
</tr>
<tr>
<td></td>
<td><strong>GESCI-UNESCO ICT-Competency Framework for Teachers (ICT-CFT) roadmap</strong>: can be tailored for teachers, teacher educators, ICT coordinators &amp; other professionals &amp; covers many common domains with the other standard frameworks</td>
</tr>
<tr>
<td></td>
<td>o Common domains include: student learning, curriculum development, pedagogy, professional development &amp; leadership;</td>
</tr>
<tr>
<td></td>
<td>o In addition the roadmap presents system domains for policy, organization &amp; management and law &amp; ethics (giving the teacher a new role in these domains).</td>
</tr>
<tr>
<td></td>
<td>o Has four levels for competency acquisition from beginning to technology literacy to knowledge deepening to knowledge creation</td>
</tr>
<tr>
<td></td>
<td>o Comparatively the GESCI-UNESCO ICT-CFT framework is more embracing because it touches on domains right from management level to teacher development where other frameworks are more limited in scope.</td>
</tr>
<tr>
<td></td>
<td>o Clearly defined parameters that can enable implementation by policy makers and</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Review Areas</th>
<th>Group Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>practitioners alike</td>
</tr>
</tbody>
</table>
| **Weaknesses**     | • **ISTE standards** do not seem to have a scaling rubric for different levels of competency  
|                    |   o No clear descriptions of each standard  
|                    |   o No clear indicators\not measurable  
|                    | • **ICT-Standards for Teachers in South Africa** lacking a policy focus in standards  
|                    | • **ICT-TSA framework**  
|                    |   o is unable to cover other important issues such as policy, organisation and administration, which are related to ICT integration.  
|                    |   o confines itself to classroom activities related to knowledge , skills and attitude  
|                    | • **ICT-CFT framework** is too verbose and may interfere with easy comprehension  

In the follow-up discussion to group presentations it was clarified that the ISTE standards in common with the ICT-TSA, ICT-CFT and South African standards and competencies do have clear performance indicators that are documented and that can be used for measuring progress.

Due to time limitations in the workshop the ICT Teacher Competency core group examined the second part of the task with questions on whether the competencies for teachers in Ghana should be general or specific, should be targeted at pre-service or in-service, or developed for teachers or teacher educators, or any other group. A summary of the group discussions and core group reflections is presented in Table 9 below.

**Table 9: Role of ICT Competencies in Teacher Development in Ghana**

<table>
<thead>
<tr>
<th>Questions</th>
<th>ICT Teacher Competency Core Group Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Which ICT competencies do we want to develop — generic competencies or technical /subject specific competencies?</td>
<td>• Develop generic ICT competencies which will be versatile / flexible enough to be applicable to any subject.</td>
</tr>
<tr>
<td>2. Do we want general competencies to cover all teachers? Or are we talking about specific ICT competencies for teachers/teacher educators/ ICT technicians / Principals/ Inspectors?</td>
<td>• General competencies should cover all teachers so that a principal or inspector will know what to expect when he/she enters a school or class.</td>
</tr>
<tr>
<td>3. Do we want a continuum of ICT competencies to cover different teacher levels from beginning teachers, to practicing teachers, to advanced teachers to other actors/roles?</td>
<td>• Yes, that will make the teachers flexible because a teacher could be teaching different levels at the same time. E.g. an English teacher could be teaching year one, two and three at the same time.</td>
</tr>
<tr>
<td>4. Do we want an ICT teacher competency framework to satisfy the needs for teacher professional development or for teacher accountability purposes, and/or for both?</td>
<td>• It should run for both; for periodic self-evaluation</td>
</tr>
<tr>
<td>5. Do we want competencies that are applicable for national level, regional level and/or international level accreditation?</td>
<td>• Competencies should be applicable to national level accreditation because our curricula for schools are centrally developed; at the same time it should also be applicable to international level accreditation. That will make the framework internationally recognised and useable.</td>
</tr>
<tr>
<td>6. Who would be the custodian and implementers of developed competencies at national / regional level?</td>
<td>• The custodian will be the policy maker and school leaders; and implementers will be school leaders and teachers. At the transforming stage, the students will be part of the implementers.</td>
</tr>
</tbody>
</table>
The plenary discussion and core group reflection on the tasks highlighted the following aspects and issues on adapting ICT competencies for Ghana

- **Competency strengths:** The standards cover all levels of ICT use – form management to classroom practice. They are shareable and can be adapted for any context. The inclusion of policy is also important as teachers are expected to implement policy.

- **Competency weaknesses:** The standards may not be comprehensible to all stakeholders – there is a need for review to facilitate communication.

- **Generic competencies** – there is a need to develop common knowledge on competencies that are applicable across a curriculum subjects.

- **Competencies for different target groups** - there is a requirement for competencies that are comprehensible for all education practitioners from the teacher educator to the policy maker to the teacher in the classroom.

- **A continuum of professional development is needed** – as it will demonstrate where teachers are at and where they need to go.

- **National, regional, international accreditation:** The ultimate goal is the international level accreditation – starting with the national level – moving to the regional level – and then international level.

- **The custodians of the ICT-CFT** would be the policy maker, school leader, teacher and eventually the student learner.

### 3.2.6 Group work – Contextualizing ICT Competencies for Teachers in Ghana

Following the review of the international and regional competencies groups were tasked to review, discuss and provide inputs to the contextualization of the GESCI-UNESCO ICT Teacher Competency roadmap for teachers in Ghana. Groups assessed the competencies using the criteria of **relevance, clarity and coverage**. They provided suggestions for modifying, adding to or improving the competency statements & progression paths so as to contextualize them for SHS teachers.

Table 10 presents a summary of the group work feedback on the competency contextualization process based on the competency domain(s) that each group reviewed.

### Table 10: Group Feedback - Contextualization of an ICT Competency Framework for Teachers in Ghana

<table>
<thead>
<tr>
<th>Groups</th>
<th>Relevance</th>
<th>Clarity</th>
<th>Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Policy group</strong></td>
<td>• Competencies are relevant.</td>
<td>• Language is generally clear.</td>
<td>The competency coverage of policy awareness and implementing policy in classroom practice is adequate.</td>
</tr>
<tr>
<td></td>
<td>• Statements are adequate and reflect what teachers need to know and be able to do with policy application for technology use in the school &amp; classroom</td>
<td>• Progression of statements form one level to the next is clear</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The language may present challenges to teacher who will use the competencies.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Some of the statements are not clear due to the complexity of the statement structure.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The statements should be simplified to avoid ambiguity and misunderstanding</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Teachers would need to be trained on how to use the competencies for self-</td>
<td></td>
</tr>
<tr>
<td>Groups</td>
<td>Relevance</td>
<td>Clarity</td>
<td>Coverage</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Curr. & Assessment group      | Generally clear, relevant and adequate to what teachers need to know and be able to do in Ghana | - Reflective Learning may pose a problem for some student teachers, new teachers, practising teachers or teacher educators  
- Reflective learning (reviewing learning for application) should replace ‘Reflective Learning’  
- The use of the word ‘assist’ should substitute the use of the word ‘help’ – as Teachers should assist students instead of helping because help in the Ghanian context means that the recipient will do nothing | - The competency coverage of curriculum planning, learning environments, students experience, assessment, communication & collaboration & special needs education is adequate for now. |
| Pedagogy Group                | Yes the competencies are all relevant to the Ghanian context – but teachers need to be flexible in adapting the competencies to their own context of teaching and learning and the resources that are available to them. | - The competencies are generally clear for now  
- There is a need for more time to reflect on these competencies and to adapt them so as to provide more clarity for teachers in Ghana to be able to understand them, use them for application in practice and self-assessment | - Special needs education is not catered for in the sub-domain of the pedagogy competency domain  
- Problem-based learning is a new domain – but also very good as it elicits higher-order thinking |
| ICT group                     | Productivity tools, authoring tools, internet, communication and collaboration, administration and education software are all relevant to the Ghanian context. | - The language used is largely understandable except for the use of authoring tools and authoring environment | - It is comprehensive enough and there are no areas of ICT that have been left out |
| Organization & Administration group | Yes the competencies are relevant to Ghana | Yes the competencies are clear but will only be operational when resources are available | - Yes the competencies cover all key areas of what a teacher should know and be able to do with technology.  
- The competencies however should clearly state resources required for special needs |
<table>
<thead>
<tr>
<th>Groups</th>
<th>Relevance</th>
<th>Clarity</th>
<th>Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Development group</td>
<td>The competencies are relevant and adequate</td>
<td>- The competencies are generally clear</td>
<td>- Special education needs and gender are not mentioned under the Teacher Development competency domain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Under the applying level the word productivity could be expanded or simplified</td>
<td>- Equity concerns are not addressed or emphasized</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Words like on-going innovation and improvement needs to be explained very well</td>
<td>- eg. Special needs, gender and deprived communities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Yes, teachers can apply the competencies to their evaluation and self-assessment practice</td>
<td>- None of the competency domains should be excluded as they are all relevant</td>
</tr>
</tbody>
</table>

An overview of the specific suggestions for improving each domain of the competency framework as well as a first iteration of an ICT Competency Framework for Teachers in Ghana can be accessed in appendix 6.

The plenary discussion on the group work feedback highlighted the following aspects and issues on contextualizing ICT competencies for teachers in Ghana.

**Relevance**
- The competency domains are very relevant for teachers in Ghana. The statements reflect well what teachers should know and be able to do with technology in teaching and learning across the curriculum.
- The technology productivity, authoring and internet tools integrated into the competencies are all important for use in subject teaching in SHS classrooms.
- However there is a need for flexibility in the adaptation of the competencies – particularly in terms of the teaching and learning context and resources that are available to teachers in SHS classrooms and schools.
- What may be required are curriculum examples or scenarios for demonstrating the use of technology for attaining national objectives and to the contexts of teaching and learning in SHS classrooms and schools.

**Clarity**
- The competencies are generally clear. However the language may present challenges to teachers.
- There may be a need to simplify the language and also to train teachers in the new pedagogies and technologies that underpin the competency statements.
- New pedagogies in the area of problem-based learning and new technologies for creating collaborative and productivity and authoring tools and environments can present immediate challenges for teachers who are more used to traditional practices and technologies.
- There is a need for a glossary to explain terminology.
- More importantly **teachers need to be provided with clear guidelines and with very clear examples of what the competencies look like in classroom practice.**
Coverage
- The competency coverage is generally comprehensive and adequate for the Ghanaian context for now.
- Important competency domain additions for what teachers should know and be able to do would include domains on equity of access to ICT resources that can cover areas of gender, disability/special needs (inclusive of the needs of the gifted and talented), deprived communities and domains for links to industry related to competencies for the development of innovative products.
- These missing areas could possibly be included in the policy domain or teacher awareness.

Overall the exercise for contextualization of the ICT competency framework provided an opportunity for an initial reflection and discussion on the requirements for developing ICT competencies for teachers in Ghana. It was felt that the time frame in the workshop was too short and the workshop process of curriculum review and competencies too intensive to carry out an extensive review and contextualization of the framework. The workshop was simply a first step and there was a requirement for more work to examine how the language, terminology and statements in the framework can be adapted more specifically for teachers in SHS or teachers in general in Ghana.

3.2.7 Presentation – Technology Pedagogy and Content Knowledge (TPACK) in Pre-Service Education in Ghana

Dr. Douglas Agyei, Lecturer in Mathematics and Science Education, University of the Cape Coast (UCC), presented an account on research he conducted on the use of Technology, Pedagogy and Content Knowledge Education in Ghana with a focus on how he applied TPACK in Mathematics Education and Teacher Design Teams in pre-service courses for SHS teachers in UCC.

Dr. Agyei questioned whether teachers in Ghana were integrating technology in a manner that TPACK suggests to enhance learning. He explained how there are little or no opportunities for professional development activities in ICT in Education to train prospective teachers. He suggested that the approaches to teaching and learning is a lot to do with the lecture approach even in the university. One of the issues is related to teacher development where most course are focused on ICT literacy skills. The level and use of digital content is very low. Accessibility and availability is not there where the computer labs are underutilized as opposed to the computer labs in the SHS which are over-utilized.

He saw opportunities in the current education context of curriculum & policy documents to encourage ICT use, teacher education institutions which are open for such innovation and the readiness of practicing teachers and student teachers in training to learn ICT skills.

Dr. Agyei described his research for the use of technology in the form of Spreadsheet to support higher order learning and in-depth knowledge acquisition in mathematics teaching in pre-service education. This general software is readily available and user friendly for mathematics teachers and students. He combined this with activity based learning approaches focused on student centred learning. Key to programme implementation was the development of teacher support materials or exemplary curriculum materials to show students teachers ‘how to do it’. The focus was to build student-teacher capacity to develop their own curriculum materials for ICT integration to test in peer teaching teams and experiment with in the classroom. Dr. Agyei left several examples of curriculum materials that his students had developed for the use of spreadsheets in Mathematics teaching in SHS micro-teaching and practice classroom teaching.
Following the presentation Dr, Agyei was asked to considering a scenario where if he were appointed as a technical advisor to the MoE what are the strategies that you would recommend and propose to effectively use ICT Integration in Ghanaian Schools.

Dr. Agyei replied that in most African countries there are national policies but implementation is lacking. His view would be that there is a need to strengthen polices for practical use of ICT in schools. He considered that the culture in schools is an issue and favorable conditions are not there in the schools for ICT use which is discouraging. Course for Science and Math education for ICT use should be integrated into holistic approaches where PTA, school culture, GES should all come together.

3.4 Organization of Day 3 Evaluation

Participants were also requested to access and complete a survey monkey evaluation of day 3.
Day 4

4.1 Recap and Evaluations of Day 3

4.1.1 Eyes and Ears feedback

The ‘Eyes and Ears’ sessions were presented by volunteer participants who summarized the sessions of the first day of workshops from auditory (ears) and visual (eyes) perspectives.

4.1.2 Workshop Evaluation – Day 3

Ms. Esther Wachira presented an overview of participant workshop evaluations completed online after the third day of the workshop. While participants expressed general satisfaction with the quality of workshop content and facilitation of the second day of the workshop – there was some level of tension with the level and intensity of work particularly as the day’s proceedings. Nevertheless key learning points for participants on the introduction of conceptual frameworks for ICT Competencies for teachers in Ghana and for technology, Pedagogy and Content knowledge for technology integration in teacher development. Areas to be improved included the need for more handouts to groups to enable more interaction and the need to be more aware of the limitations in the introduction of concepts.

An overview of day 2 evaluation can be accessed in appendix 8.

4.2 Day 2 Presentations, Group Work & Plenary Discussions

4.2.1 Operationalizing the ICT teacher Competencies with TPACK

As a follow-up on the TPACK presentation of Dr. Agyei, Ms Mary Hooker presented an overview of the the use of Technology Pedagogy and Content Knowledge (TPACK) conceptual framework for course development in the connectivity project. Ms Hooker discussed the predominant belief about teacher preparation for teaching in relation to Content Knowledge (knowledge of teaching subject matter) and Pedagogical Knowledge (knowledge about teaching and learning that content) and the shift in teacher development programs over the past two decades where Pedagogical and Content Knowledge are developed in integrated teacher development programmes rather than as separate courses. Today teachers also need to know about Technological Pedagogical Content Knowledge (TPACK) described as the inter-connection and intersection of content, pedagogy and technology.

Ms Hooker described TPACK as a model that can give direction in developing teacher training courses whether for pre-service or in-service.

Ms Hooker then invited participants to try out the TPACK concepts with the TPACK game. The game invited participants to see what happens when you combine content, pedagogy and technology into a classroom activity. The focus was fun – an activity that could bring the workshop participants together in
plenary small groups of 3 to explore the possibilities of technology integration. Each trio of participants was given a common topic from the English SHS syllabus (short stories & narratives), a common pedagogy (activity-based learning) and one of three technology options (wikispaces, audacity software, presentation Software) to create and evaluate a sound classroom activity.

Participants explored the relation between technology, pedagogy and content as they developed their activities. They googled and researched alternative technologies to support the content and pedagogy. At least one group produced a technology artifact in the form of a podcast on story-telling using audacity software.

In presenting their activities the groups considered and discussed whether the activities promoted convergent forms of knowledge expression by the students modeled on teacher demonstration or whether they provided students with opportunities for more divergent forms of knowledge expression. The more activities and alternative technologies that were integrated into the lesson the more opportunities were created for student knowledge expression in convergent and divergent forms.

An overview of the activities created by different groups can be accessed in appendix 7. Ms. Hooker concluded the presentation with an overview of the potential use of TPACK for building teachers’ knowledge base for technology use. Major strategies for using the TPACK approach would be a) developing teachers capacity to select appropriate technologies for different classroom activities, b) to show teachers how to use ICT with exemplary curriculum materials and c) to build teacher team capacity to develop their own exemplary curriculum materials and lessons to use and share in classroom practice.

4.2.2 Group tasks on TPACK review and frameworks

The remainder of the workshop involved group tasks on TPACK lesson review and frameworks.

In the first group task participants reviewed exemplary curriculum materials in the form of Mathematics, English, Science and Geography lessons prepared by teacher teams in Ghana and Tanzania. Curriculum exemplary materials show teachers ‘how to’ integrate technology into teaching and learning by way of procedural processes for lesson preparation - identifying content activity and pedagogical options and technology tools to support the options, lesson implementation, student application of learning in individual, pair or group work, and assessment of learning.

Teams reviewed the materials, coding and comparing the CK, TK and PK components in the lessons as well as reviewing the fit of technologies to support the lesson content and pedagogies and possible alternative technologies that could be integrated.

The team exemplary curriculum reviews can be accessed in appendix 7.

In the final group task of the workshop participants were asked to develop a modular outline framework for course development that integrates TPACK and three levels of the ICT Teacher Competency in the Pedagogy Planning domain – a domain that had been deemed the highest priority area for teacher development by workshop participants.
For each competency level participants were asked to identify curriculum topics, activity types, pedagogy and technology knowledge components that teachers would require to support the content activities. From the basic framework that groups developed in the workshop it was possible to develop examples of activity types that can be further developed into curriculum exemplars for the teacher guidelines/modules.

The group contributions to the development of the TPACK frameworks and activity types can be accessed in appendix 7.

In an open discussion which followed the TPACK presentations participants discussed the value of the TPACK approach for the Ghana context. The following summary provides an overview of the main discussion points:

- This strategy in applicable to Ghana
- This approach makes learning real and authentic
- It makes the facilitating role of the teacher to become real
- When the teacher interacts with the software, he will see new ways of interacting with software and becomes better with time
- If the teachers are trained they will understand that they have more resources than they need
- Teachers are presented with a situation where students are doing more work and are more knowledgeable due to their use of different channels to acquire and complement the knowledge provided in school. Cultural dimensions need to be addressed.
- Teachers can be put off when teachers realize that they cannot get the accessories and equipment for presentation.
- Teachers should also try and acquire equipment by themselves. The prices have come down. We should not wait for the government.
- Sacrifices must be made to make learning better. Teachers have to be proactive.
- Technology can generate excitement and teachers then become motivated. What can we do to increase that motivation in the schools. Let your administrator have evidence that you can do something with technology after which they will support you as teachers.
- How to use technology in large classes in Ghana – how can this be done?
4.3 Workshop Outcomes and Next Steps

The following steps were discussed and agreed on for follow-up on the workshop development of the ICT Contextualized Competencies for Teachers in Ghana and modules for teacher development that are aligned to priority competencies:

1. Review the workshop inputs for contextualizing ICT Teacher Competencies and for developing TPACK framework as a basis for training modules

2. 1st Iteration of Contextualized ICT competency Standards for Teachers in Tanzania
   Next steps:
   - Compile workshop inputs for contextualized ICT Competency Framework for Teachers in Ghana
   - Circulate 1st iteration of competencies by 1st/2nd week of January

3. 1st Draft Outline Modules for Teacher Training
   - Compile workshop inputs to teacher development TPACK frameworks into a modular/guideline outline
   - Circulate 1st outline drafts by 1st/2nd week of January

4. ICT Teacher Competency & Guidelines Core Team

   Those in the ICT Teacher Competency Core Team are:
   - TED – English – Rev Emmanuel Dadebo
   - CRDD ICT – Ama Banini
   - UCC – Maths - Dr. Douglas Agyei
   - SED – Maths – Peter Ata Gyamfi
   - CRDD – Science – Antwi Aning
   - SHS - English – Esperance

   The work will be carried out through virtual collaboration without a face-to-face session
   Starting in January 2013 Ms. Mary Hooker will send a schedule on when and what should be done.

4.2 Closing Remarks

Mr. Charles Aheto Tsegha, The Deputy Director General of the Ghana Education Services, paid a brief visit to the workshop to commend the work and the active participation of all in the workshop process. While thanking participants and facilitators for their contributions.

Mr. Richmond Atta-Williams provided the closing remarks to the workshop thanking participants for their participants and comprehensive contributions to the workshop process and wishing them all the best for the next phase of the workshop process on content evaluation.

4.3 Workshop Media

Link to photo stream artefacts from the workshop process can be accessed here: http://www.flickr.com/photos/46250088@N05 sets/72157632153754026/show/
## Appendix 1 – List of Participants

<table>
<thead>
<tr>
<th>Names</th>
<th>AREA OF SPECIALIZATION</th>
<th>Institutions</th>
<th>EMAIL</th>
<th>TEL NO:</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>
## Appendix 2 – Workshop Programme

### Day 1: 26\textsuperscript{th} Nov 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Description</th>
<th>Facilitators</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00–08:30 Hrs</td>
<td>Opening remarks</td>
<td>Opening Remarks— The potential of ICT to support the aims and objectives of the curriculum</td>
<td>GES</td>
</tr>
<tr>
<td>08:30–09:00 Hrs</td>
<td>Introductions</td>
<td>30 sec Peer-Introduction- Expectation &amp; concerns for workshop process</td>
<td>Esther Wachira, GESCI</td>
</tr>
<tr>
<td>09:00 – 09:30</td>
<td>Review context</td>
<td>Rationale for the review and the process</td>
<td>GES/CRDD</td>
</tr>
<tr>
<td>09:00–10:00 Hrs</td>
<td>Situational Analysis</td>
<td>Overview of ICT teaching/integration in Senior High Schools</td>
<td>CRDD</td>
</tr>
<tr>
<td>10:00 – 10:15</td>
<td>Coffee / Tea break</td>
<td></td>
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</tr>
<tr>
<td>10:15-10:45 Hrs</td>
<td>Global Trends and Frameworks shaping Curriculum Renewal and Innovation</td>
<td>Interactive presentation on Global Trends and Frameworks Shaping Curriculum Renewal and Innovation</td>
<td>Patti Swarts, GESCI</td>
</tr>
<tr>
<td>10:45-11:30 Hrs</td>
<td>21\textsuperscript{st} Century Skills and ICT as an enabler of teaching and learning</td>
<td>21\textsuperscript{st} Century skills and the pivotal role of ICTs in learning in the Knowledge Age Plenary Task: Importance-Prioritization Scan of learning priorities in ICT, Science, Mathematics and English</td>
<td>Patti Swarts, GESCI</td>
</tr>
<tr>
<td>11:30-12:15 Hrs</td>
<td>Examining of subject curricula from other countries in these subjects to assess integration of ICTs</td>
<td>Group work – Subject curricular documents from different countries – how ICTs are integrated, which ICTs for which topics/appropriateness of ICT for topic/area? Integration issues?</td>
<td>Group work, Esther Wachira</td>
</tr>
<tr>
<td>12:15 – 13:00</td>
<td>Plenary -</td>
<td>Plenary – Group feedback on subject curriculum documents &amp; issues</td>
<td>Groups’ presentations</td>
</tr>
<tr>
<td>13:00 – 14:00</td>
<td>Lunch</td>
<td></td>
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<tr>
<td>14:00 – 14:30</td>
<td>Plenary: – Brainstorming on how ICTs can facilitate the attainment of the priorities and improve teaching and learning in the subjects</td>
<td>Brainstorm: How priorities can be best served through integration of ICTs Group feedback</td>
<td>Esther Wachira, GESCI</td>
</tr>
<tr>
<td>14:30 – 14:45</td>
<td>Introduction of Curriculum mapping process and template</td>
<td>Process and tool introduced and explained</td>
<td>Patti Swarts, GESCI</td>
</tr>
<tr>
<td>14:45 – 16:00</td>
<td>Use of curriculum mapping template to examine broader curricular issues</td>
<td>Group work: use mapping template to identify broader curricular issues to consider in review Plenary feedback</td>
<td>Group work</td>
</tr>
</tbody>
</table>

### Objectives Day 1

- Share Global Trends and Frameworks shaping Education and Curriculum Renewal and Innovation
- Introduce 21\textsuperscript{st} century skills and the role of ICTs as an enabler of learning and teaching
- Allow participants to reflect on their own country-level experiences and curriculum contexts, with a particular focus on ICT skills needs for Senior High School teachers and students and the requirements of the workplace.
Day 2: 27th Nov 2012

Objectives Day 2

Review of subject curricula in ICT, Science, Mathematics, English for Senior High Schools
Identify key learning opportunities/topics in each subject for the integration of ICTs
Reflect on how assessment practices and procedures would have to be aligned to support learning with and through ICTs
Identify what ICTs would be appropriate for the context and topics/purposes identified
Identify teacher preparation needs
Develop guidelines for implementation of review findings.

Time | Activity | Description | Facilitators
--- | --- | --- | ---
16:00 - 16:30 Hrs | Eyes & Ears and evaluation feedback | Volunteers to provide the recap of day 1 on day 2 Participants to fill in online evaluation of day 1 | Mary Hooker, GESCI

Day 3: 28th November

Objectives Day 1

Global Trends and Frameworks Shaping Education
Share Global Trends and Frameworks shaping Education and Teacher Development
Introduce ICT Competency Standards for Teachers - the UNESCO ICT-Competency Framework for Teachers (ICT-CFT) as well as examples of international, regional and national frameworks
Allow participants to reflect on their own country-level experiences and teacher development contexts, with a particular focus on ICT skills needs for Senior High School Teachers and Administrators.

Time | Activity | Description | Facilitators
--- | --- | --- | ---
08:00–08:30 Hrs | Opening remarks | Opening Remarks—ICT and Education and the role of teachers | GES
08:30–09:00 Hrs | Introductions - Expectations & concerns | 30 sec Peer-Introduction- Expectation & concerns for workshop process | Mary Hooker, GESCI
09:00 – 09:30 | Situational Analysis | Overview of Pedagogical Survey – ICT use in Senior Secondary Schools | Esther Wachira, GESCI
09:00–10:00 Hrs | Global Trends and | Global Trends and Frameworks Shaping Education | Mary Hooker, GESCI
<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Description</th>
<th>Facilitators</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 – 10:15</td>
<td>Coffee / Tea break</td>
<td></td>
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<tr>
<td>10:15-10:45 Hrs</td>
<td>ICT Competency Framework for Teachers (ICT-CFT)</td>
<td>ICT Competencies in Teacher Development: Nature and rationale of Competence; the UNESCO ICT Competency Framework for Teachers (ICT-CFT) Plenary Task: Importance-Prioritization Scan of ICT- CFT Competencies for Teachers in Ghana</td>
<td>Mary Hooker, GESCI</td>
</tr>
<tr>
<td>10:45-11:30 Hrs</td>
<td>Examining competency documents and competency issues</td>
<td>Group work – Competency documents from different countries - who are they for? Strengths and weaknesses? Competency framework issues - general or specific, pre-service or in-service, separate or embedded in existing competencies, multiples sets for different target groups (teachers, school leaders, policy makers, ICT coordinators)?</td>
<td>Group work</td>
</tr>
<tr>
<td>11:30-12:15 Hrs</td>
<td>Plenary</td>
<td>Plenary – Group feedback on competency documents &amp; issues</td>
<td>Groups’ presentations</td>
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<tr>
<td></td>
<td>Standards for standards – assessing the ICT-CFT</td>
<td>Group discussions and assessments (4 Groups) – Applying the criteria to assess adequacy of competency performance statements &amp; progressions</td>
<td>Group work</td>
</tr>
<tr>
<td>13:00 – 14:00</td>
<td>Lunch</td>
<td></td>
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<tr>
<td>14:00 – 15:15</td>
<td>Contextualization &amp; adaptation</td>
<td>Contextualize competencies for Senior High School Teachers in Ghana</td>
<td>Group work</td>
</tr>
<tr>
<td>15:15 – 16:00</td>
<td>Plenary</td>
<td>Plenary – Group feedback - on adequacy, limitations and contextualization of the competencies Next steps – ICT-CFT contextualization validation from country education stakeholders / community</td>
<td>Groups’ presentations GESCI</td>
</tr>
<tr>
<td>16:00 - 16:30 Hrs</td>
<td>Eyes &amp; Ears and evaluation feedback</td>
<td>Volunteers to provide the recap of day 1 on day 2 Participants to fill in online evaluation of day 1</td>
<td>GESCI</td>
</tr>
</tbody>
</table>

**Day 4: 29th November**

**Objectives Day 2**
- Contextualizing the ICT Competency Framework for Teachers
- Contextualization of ICT-CST Standards for teachers in Ghana (based on standards criteria of Relevance, Clarity and Coverage)
- Introduce a Technology, Pedagogy and Content Knowledge (TPACK) framework for integrating technology in teaching and learning
- Develop TPACK module outlines based on ICT Competency Standards/ Content Evaluation/ Curriculum Review for Senior High School Teachers in Ghana
- Develop a plan for implementation of ICT teacher Competencies

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<th>Description</th>
<th>Facilitators</th>
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<tbody>
<tr>
<td>08:00-08:15 Hrs</td>
<td>Recap</td>
<td>Eyes and Ears</td>
<td>Participants</td>
</tr>
<tr>
<td>08:15-08:30 Hrs</td>
<td>Discussions</td>
<td>Feedback reflections – Day 1</td>
<td>GESCI</td>
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<tr>
<td>08:30-09:00 Hrs</td>
<td>The Technology, Pedagogy and Content Knowledge (TPACK) Framework</td>
<td>The Technology, Pedagogy, Content Knowledge (TPACK) Model – Overview and review of Model via the TPACK</td>
<td>Mary Hooker, GESCI</td>
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<tr>
<td>Time</td>
<td>Activity</td>
<td>Description</td>
<td>Facilitators</td>
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<tr>
<td>09:00 – 09:30 Hrs</td>
<td>TPACK in Ghana – Interactive presentation and discussion</td>
<td>TPACK in Teacher Education in Ghana – with a focus on TPACK in Mathematics Education and Teacher Design Teams</td>
<td>Dr. Douglas Agyei</td>
</tr>
<tr>
<td>9:30 – 10:00</td>
<td>Integrating Technology into SME – using TPACK Guide</td>
<td>Developing TPACK outlines Stage 1 Group work – Science, Mathematics, English Specialist Design Teams Design teams use of TPACK template to develop strategies for integrating technology – to support SME teaching activities</td>
<td>Group work</td>
</tr>
<tr>
<td>10:00 – 10:15</td>
<td>Coffee / Tea break</td>
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<tr>
<td>10:15-11:30 Hrs</td>
<td>Integrating Technology into SME – using TPACK Guide</td>
<td>Developing TPACK outlines Stage 1 Group work – Science, Mathematics, English Specialist Design Teams Design teams use of TPACK template to develop strategies for integrating technology – to support SME teaching activities</td>
<td>Group work continued</td>
</tr>
<tr>
<td>11:30-13:00 Hrs</td>
<td>Module Outlines</td>
<td>Developing TPACK modular outlines - Stage 2 Group work – SME Modular Design Teams Focus on one priority area linked to Competency Importance-Prioritization Scan Use of TPACK template to develop module outline integrating – contextualized ICT competencies, content mapping, pedagogical approaches from national curriculum framework</td>
<td>Group work continued</td>
</tr>
<tr>
<td>13:00–14:00 Hrs</td>
<td>Lunch</td>
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<tr>
<td>14:00 – 15:00 hrs</td>
<td>Plenary</td>
<td>Plenary: Presentations of modules on three themes and open discussion</td>
<td>Group presentations Mary Hooker</td>
</tr>
<tr>
<td>15:00 – 16:00 Hrs</td>
<td>Plenary: Development of Action Plan for Implementation</td>
<td>Identify next steps, development and review of modules; responsible agencies, timelines</td>
<td>Mary Hooker and Esther Wachira, GESCI</td>
</tr>
<tr>
<td>16:00 - 16:30 Hrs</td>
<td>Closing Remarks Final Evaluation</td>
<td>Closing remarks Participants fill in online evaluation of day 2</td>
<td>MoE Official GESCI</td>
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</table>

Outcomes of the workshop
Draft reviews of subject curricula for ICT, Science, Mathematics and English with recommendations on learning with and through ICTs, topics for the integration of ICTs, appropriate ICTs, teacher preparation for learning with and through ICTs Agreement on next steps, based on guidelines and timelines A contextualized draft of ICT competencies standards for Senior High School Teachers in Ghana, capacity to to develop modules for mainstream competencies at the national level and to integrate the ICT competencies in continuous professional development programme
Appendix 3 – Workshop Presentations

See *Overview of Workshop Presentations* in PDF attach to report
Appendix 4 – Group Task Feedback – Examining ICT Syllabuses from around the world

See *Group Work – Examining ICT Syllabuses from Other Countries* in PDF attach to report
Appendix 5 – Group Task Feedback – Curriculum Mapping

See Group Work – Curriculum Mapping in PDF attach to report
Appendix 6 – Group Task Feedback – Contextualized ICT Teacher Competencies for Teachers in Ghana

See *Group Work – Contextualized ICT Teacher Competencies for Teachers in Ghana* in PDF attach to report...
Appendix 7 – Group Task Feedback – TPACK Game, Lesson Review and Frameworks

See Group Work – TPACK Game, Lesson Review and Framework in PDF attach to report
Appendix 8 – Workshop Evaluations

Day 1 Evaluations – ICT Curriculum Review

Please rate the quality of the content in the workshop sessions today

- The sessions’ objectives were clear
- The sessions covered topics appropriate for achieving the objectives
- The content contributed to expected outcomes
- The supporting materials were useful, stimulating & interesting
- The methodology/level of interactivity was appropriate

Please rate the quality of the presentations in the workshop sessions today

- Style of topic presentation was appropriate
- Time allotted for interaction/discussion was adequate
- Facilitation and moderation were effective
- Time management was effective and efficient

Legend:
- Poor
- Fair
- Good
- Very Good
- Excellent
Key Learning on Day 1

• MY EXPECTATION WAS MEET
• ICT METHODOLOGIES IDENTIFIED IN GHANA SYLLABUS AND THE 21ST CENTURY SKILLS
• The comparison of the Ghanaian and Singaporean syllabus in relation to the use of ICT
• THE REVIEW OF THE SYLLABUS FROM OTHER COUNTRIES
• Integration of ICT in the various subject disciplines
• Evaluation of the ICT types & methodologies in the Singapore Mathematics syllabus
• ICT Integration as a process with different levels of achievement
• ICT integration in other subject areas to improve teaching and learning
• They level of ICT used in Ghana syllabus (science)
• IMPLEMENTING ICT IS COSTLY BUT AS FACILITATORS OF LEARNING, WE CANNOT AFORD TO LEAVE OUT THE INTEGRATION OF ICT IN SCHOOLS.
• ICT Integration approaches are varied
• THE RELEVANCE OF ICT INTEGRATION IN THE EDUCATION CURRICULUM IN GHANA
• The need to integrate ICT across the various disciplines; and the need to provide the resources and teacher training
• SETTING PRIORITIES FOR ICT INTEGRATION FOR GHANA EDUCATION SYSTEM
• 21st learning skills: sharing information, observation, Discovery, Research, Enquiry, Evaluation, Active listening.
• Was on the participants ability to understand that we need to apply best practices to achieve the integration we need.

Areas for Improvement on Day 1

• BY BEING TIME CONSCIOUS
• MORE TIME SHOULD BE GIVEN FOR GROUP WORK
• More interactive discussions between group members
• THE TIME SHOULD ME MORE
• Videos and pictures for the workshop should be previewed before the lesson to allow maximum understanding and enhance proper time management
• more time should be given to group activities
• increase time for group work a bit
• Less content lecture, more interaction between participants and facilitators, good time management
• THERE SHOULD BE MORE TIME FOR GROUP DELIBERATIONS TO GENERATE MORE ELABORATE IDEAS.
• More time for group work
• ENOUGH TIME SHOULD BE ALLOCATED FOR GROUP WORK AND PRESENTATION
• Content and process to me were adequate
• WITH VIDEOS, THE THINGS ON WHICH THE VIDEO IS BASED SHOULD BE EXPLAINED BEFORE THE PRESENTATION OF THE VIDEO FOR BETTER UNDERSTANDING AND ANALYSIS
• The time for group and individual works could be improved upon.
• Discussion should move us to a common understanding of where to start our integration.
Day 2 Evaluations – ICT Curriculum Review

Please rate the quality of the content in the workshop sessions today

- The sessions’ objectives were clear
- The sessions covered topics appropriate for achieving the objectives
- The content contributed to expected outcomes
- The supporting materials are useful, stimulating & interesting
- The methodology/level of interactivity was appropriate

Please rate the quality of the presentations in the workshop sessions today

- Style of topic presentation was appropriate
- Time allotted for interaction/discussion was adequate
- Facilitation and moderation were effective
- Time management was effective and efficient
## Key Learning on Day 2

- Group work
- LEARNING OUTCOME WAS MEET.
- On the subject syllabus review, the criticisms and contribution of other group members was constructive and helpful
- ICT COMPETENCIES AND SKILLS
- The use of ICT to facilitate the teaching and learning of particular topics in English Language
- ICT needed by both teachers and students to enable them teach and the subjects
- ICT INTEGRATION
- development of instructional approaches- moving from teacher centred approach to child centred approach.
- the review of the mathematics syllabus
- THE RELEVANCE OF ICT SKILLS AND TEACHER NEEDS TO THE TEACHING OF ENGLISH LANGUAGE
- THE REVIEW OF THE DRAFT CURRICULUM IN ICT INTEGRATION
- The opportunity for the subject base teachers to express the real inefficiency in the departments to ensuring the ICT tuition in schools.
- ICT integration matrix and how this can be applied to our various subject areas.
- Reviewing the science syllabus with ICT integration as a tool
- POSSIBLE INTEGRATING ICT IN THE TEACHING IF TEACHERS POSSIBLE ATTAINABLE SKILLS
- I learnt that the ICT needs ought to be integrated in stages
- Subject syllabus review
- SCIENCE SYLLABUS MAPPING FOR ICT INTEGRATION

## Areas for Improvement on Day 2

- Participant centred
- MORE TIME SHOULD GIVING
- Guidelines on teacher preparation and needs
- MORE EXPLANATION TIME FOR THE GROUP WORK TASKS
- more time for group work and discussions
- N/A
- We can be supported with more examples where the participants are substandard in knowledge.
- tasks given to various groups should be clear and exact avoid confusion of ideas
- TEACHERS PARTICIPATION
- ENOUGH HANOUTS SHOULD BE GIVEN TO PARTICIPANTS
- It is a critical area for a re-look as we travel the path of integration.
- Content and process in the form of group work and presentation was okay but I wish we had more time for each activity.
- Today's content was clear to understand.
- the time for closing need to be improve
- Time management
- NOT SURE
Day 3 Evaluations – ICT Teacher Competency

Please rate the quality of the content in the workshop sessions today

- The sessions' objectives were clear
- The sessions covered topics appropriate for achieving the objectives
- The content contributed to expected outcomes
- The supporting materials are useful, stimulating & interesting
- The methodology/level of interactivity was appropriate

![Bar chart showing ratings for each aspect of the session quality.](chart.png)
Key Learning on Day 3

- COMPETENCY FRAMEWORK FOR TEACHER
- Competencies comparison
- Comparing and contrasting the GESCI and the iste.nets.t ICT competency framework and contextually assessing the GESCI framework on policy & professional development
- COMPARING BETWEEN THE GESCI FRAMEWORK AND S/A ONE GIVES ME MORE INSIGHT ABOUT CURRICULUM DEVELOPMENT
- CONCEPTUALIZATION OF COMPETENCIES WAS UNDERSTOOD
- The presentation by Dr. D, Agyei on TPACK.
- THE ROLE OF ICT COMPETENCIES FRAMEWORK
- What technology integration really implies? b) A review of various countries and organizations' ICT Competency Framework
- Examining ICT Standards and competency levels
- Giving an explicit or comprehensive report on group assignments actuals pays.
- The presentation by Dr. D, Agyei on TPACK.
- ICT COMPETENCY FRAMEWORKS SHAPING EDUCATION AND TDP
- ICT COMPETENCY FRAMEWORK
- ICT STANDARDS AND COMPETENCIES AND THEIR COMPARISON
- ROLE OF ICT COMPETENCIES FRAMEWORK
- Integration is achievable
- THE GROUP WORK

Areas for Improvement on Day 3

- TIME
- more exposition to TPACK approach
- MORE TIME IS REQUIRED
- THE MATERIALS (HANHOUTS) FOR EACH SESSION SHOULD BE GIVEN TO PARTICIPANTS AT THE END OF EACH PRESENTATION
- There should more interactions among group members
- TERMINOLOGIES SHOULD BE BROKEN DOWN
- I wish there was longer time for each exercise - the group work in particular
- Some of the terminologies need to be simplified
- For group tasks, participants would appreciate more than one copy of question papers.
- There should more interactions among group members
- More time should be allocated for the group work
- NOT SURE
- NOTHING MORE
- Teacher focus
- TODAY WERE STRETCH A LITTLE