Case Study: Kenya & Tanzania
Contextualizing and Implementing the ICT-CFT to Support STEM Innovative Practice

UNESCO Bangkok - Regional Meeting
Supporting Competency-Based Teacher Training Reforms to Facilitate ICT-Pedagogy Integration Project
Radisson Blu Plaza, Bangkok, Thailand
27-28 October 2015

Mary Hooker – Senior Education Specialist, GESCI
mary.hooker@gesci.org
Outline

• Brief Review – ICT-CFT Kenya & Tanzania STEM Teachers In-service
• Alignment – Curriculum Mapping & Module Development
• Assessment – Evaluation of ICT-CFT competencies in practice
• Impact & Issues – Effectiveness & Knowledge Sharing
Brief Review
Development of ICT-CFT Competency Standards

Kenya & Tanzania Case Study
In-service STEM Secondary Teachers

*Strengthening Innovative Practice in Secondary Education (SIPSE)*
A phased approach to building teacher capacity for ICT use in STEM

UNESCO ICT-CFT & SIPSE

Prioritizing aspects of a teacher’s work

Adapted: UNESCO 2011; CoL 2015
Adaptation of ICT-CFT for SIPSE In-service STEM Teachers in Kenya and Tanzania

<table>
<thead>
<tr>
<th>Stage</th>
<th>Activities</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>Needs Assessment &amp; Situational Analysis</td>
<td>2 months</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Contextualization &amp; prioritization of ICT-CFT competencies</td>
<td>2 day workshops</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Curriculum mapping against priorities</td>
<td>2 weeks</td>
</tr>
<tr>
<td>Stage 4</td>
<td>Module development using ICT-CFT &amp; TPACK frameworks</td>
<td>4 months</td>
</tr>
<tr>
<td>Stage 5</td>
<td>Assessment, evaluation &amp; scale up</td>
<td>On-going</td>
</tr>
</tbody>
</table>
**Kenya Curriculum of Prioritized ICT Teacher Competencies**

<table>
<thead>
<tr>
<th>Key Curriculum Areas</th>
<th>Emerging</th>
<th>Technology Literacy</th>
<th>Knowledge Deepening</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Policy Awareness</strong></td>
<td>Teachers identify and discuss local, national, and global policies for technology integration in education and development.</td>
<td>Teachers contribute to the development of a shared school vision and planning for ICT integration that is based on national policy.</td>
<td>Teachers discuss and work collaboratively with others for vision and planning implementation that focuses on exploiting new and more effective approaches for ICT integration across all subject areas in the school.</td>
</tr>
<tr>
<td><strong>Policy – Classroom Practice</strong></td>
<td>Teachers create lesson plans with a basic reference to school and national ICT policy and practice.</td>
<td>Teachers identify key characteristics of classroom practices and specify how these characteristics can or may not serve to implement policies (TL.1.a).</td>
<td>Teachers explain and analyze the principles of using ICT in education. Describe how these principles can be put into practice in their own teaching. Analyze what issues arise in implementing these principles and how these issues can be addressed (K.D.1.a).</td>
</tr>
<tr>
<td><strong>Curriculum &amp; Assessment – Curriculum Planning</strong></td>
<td>Teachers explain how existing curriculum objectives and assessment procedures can include the use of technology to support student learning and outcomes.</td>
<td>Teachers match specific curriculum standards to particular software packages and computer applications and describe how these standards are supported by these applications (TL.2.a).</td>
<td>Teachers design units and classroom activities that integrate in a structured way a range of ICT tools and devices to support student learning.</td>
</tr>
<tr>
<td><strong>Curriculum &amp; Assessment – Student Experience</strong></td>
<td>Teachers research and discuss ways that digital tools and resources can help students to explore issues and key concepts and processes in areas of interest and subject specific areas.</td>
<td>Teachers select and demonstrate the use of technology resources that enable students to explore issues and key concepts and processes in areas of interest and subject specific areas.</td>
<td>Teachers identify key concepts and processes in the subject area, describe the function and purpose of subject specific tools and how they support students’ understanding of these key concepts and processes and their application to the world outside the classroom (K.D.2.a).</td>
</tr>
</tbody>
</table>

---
Alignment

SIPSE Pilot & ICT-CFT

Contextualized Prioritized Competencies
Informing Course Design & Development
### SIPSE Course Alignment - ICT-CFT Prioritized Competencies

#### Technology Literacy Modules

**Module 1.1**  
**ICT use in Didactic Teaching**  
- Teachers describe how didactic teaching with ICT can be used to support students’ acquisition of STEM subject matter knowledge (TL.3.a).  
- Teachers incorporate appropriate ICT activities into lesson plans so as to support students’ acquisition of STEM subject matter knowledge. (TL.3.b)

**Module 1.2**  
**ICT & Teacher Productivity Strategies**  
- Teachers are able describe and demonstrate the basic tasks and uses of word processors, presentation, spreadsheet and the internet (TL.4.b)  
- Teachers use ICT to enhance their productivity. (TL.6.a)

**Module 2.1**  
**ICT & STEM Curriculum Standards**  
- Teachers should be able to match specific curriculum standards to particular software packages and computer applications and describe how these standards are supported by these applications. (TL.2.a)  
- Teachers help students acquire ICT skills within the context of their subjects or courses. (TL.2.b)

**Module 2.2**  
**National Policies and their impact on Education**  
- Teachers are able to identify key characteristics of classroom practices and specify how these characteristics serve to implement national policies (TL.1.a)

**Module 3**  
**ICT in the Classroom & Computer Lab**  
- Teachers integrate the use of a computer laboratory into on-going teaching activities. (TL.5.a)

#### Knowledge Deepening Modules

**Module 4.1**  
**Problem-Based Learning & ICT in the Classroom**  
- Teachers describe how ICT can be used to support students’ acquisition of knowledge and skills (KD.3.b)  
- Teachers incorporate appropriate ICT activities into lesson plans so as to support students’ acquisition of knowledge and skills. (KD.5.a)

**Module 4.2**  
**Teacher Collaboration, Professional Learning Networks & ICT**  
- Teachers are able to identify key characteristics of classroom practices and specify how these characteristics serve to implement national policies (KD.4.f, KD.6.b)

**Module 5.1**  
**STEM Subject Specific ICT Tools & Software**  
- Teachers are able to identify key characteristics of classroom practices and specify how these characteristics serve to implement national policies (KD.2.a, KD.4.a)

**Module 5.2**  
**STEM Lesson Plans to Support ICT Policy**  
- Teachers are able to identify key characteristics of classroom practices and specify how these characteristics serve to implement national policies (KD.1.a)

**Module 6**  
**Project Based Learning**  
- Teachers are able to identify key characteristics of classroom practices and specify how these characteristics serve to implement national policies (KD.3.a)
SIPSE Course Alignment - ICT-CFT Prioritized Competencies

| Technology Literacy | 1a | 2a | 3a | 3b | 3c | 4a | 4b | 4c | 4d | 4e | 4f | 4g | 4h | 4i | 4j | 4k | 5a | 5b | 5c | 6a | 6b | 6c |
|---------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Module 1.1          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Module 1.2          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Module 2.1          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Module 2.2          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Module 3            |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |

<table>
<thead>
<tr>
<th>Knowledge Deepening</th>
<th>1a</th>
<th>2a</th>
<th>2b</th>
<th>3a</th>
<th>3b</th>
<th>3c</th>
<th>3d</th>
<th>3e</th>
<th>3f</th>
<th>4a</th>
<th>4b</th>
<th>4c</th>
<th>4d</th>
<th>4e</th>
<th>4f</th>
<th>4g</th>
<th>4k</th>
<th>4g</th>
<th>4k</th>
<th>5a</th>
<th>5b</th>
<th>5c</th>
<th>6a</th>
<th>6b</th>
<th>6c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module 4.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Module 4.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Module 5.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Module 5.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Module 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Priority competencies coverage**
- **Secondary competency coverage**
Phased Approach - Teacher Development

... gradually building teacher capacity in ICT use for innovative practice...

... ICT Competency Framework for Teachers (ICT-CFT)

... Technology Pedagogy and Content Knowledge (TPACK)

**Knowledge Deepening Level:** Use of more sophisticated methodologies and technologies with changes in pedagogy and curriculum

**Knowledge Creation Level:** Transformational and specialized use of ICT – redefining classroom and the role of teachers – learning & innovation – specialization

**Technology Literacy level:** Use of basic ICT tools in standard curriculum

**Beginning Level:** Exploratory use of ICT for professional planning and organization
SIPSE Course Alignment

ICT-CFT-TPACK-in-practice

1. Exemplary Curriculum Materials (TCK) 10%
2. ICT & Pedagogical Strategies (TPK) 20%
3. ICT Tool Demonstration & Practice (TK) 20%
4. Classroom Application (TPACK) 50%

Module 1.1: ICT use in Didactic Teaching

Source: The TPACK Image - Reproduced by permission of the publisher, © 2012 by tpack.orgtpack.org
**Exploring ICT use** to support didactic teaching

**Whole class discussion**
Questioning techniques
Collaborative group work

**Blended Learning**
1. Orientation workshops/ reflection & policy forums
2. Online e-learning, m-learning, teacher portals/ offline CDs
3. School based teacher professional learning

**SIPSE Course Design**
**Pilot Model & Innovation Package**

*Supporting Innovative Practice in Science, English and Mathematics with ICT and non-ICT resources*

**Teacher try outs**
Peer-to-peer observation
Reflective practice
Self-assessment

**Exploring ICT use** to support problem and project based learning

Teacher **Design Teams**
Collaborative community of practice

10 Master Trainers, 20 schools, 120 teachers, 5,000 students – Kenya & Tanzania
SIPSE Course Design
School-based, cyclical, experiential, contextual, problem solving, focus

Use of teachers’ ‘epistemic resources’ to explore new design ideas or ‘frames’ for innovative practice

Re-designed ideas for improving practice
Online discussion forums & chats
Reflection on current practice challenges/problems
Develop lesson plans in STEM teacher design teams
Design & try out ideas using ICT in classroom practice

Adapted: Koh, Chai, Wong & Hong, 2015
SIPSE Course Design - ICT-CFT-TPACK-in-practice

**Unit 1**
- Exemplary Curriculum Materials (TCK)
- ICT-enhanced lesson plans
- Teacher Guides
- E-resources – student worksheets

**Unit 2**
- ICT & Pedagogical Strategies (TPK)
- Traditional didactic
- New pedagogical strategies, techniques
- Problem & project based learning

**Unit 3**
- ICT Tool Demonstration & Practice (TK)
- Teacher productivity tools
- ICT tool specific use in STEM
- Open education resources & software

**Unit 4**
- Classroom Application (TPACK)
- Teacher design team lessons & resources
- Technology enhanced try-outs
- Teacher reflection & redesign

Module 1.1: ICT use in Didactic Teaching

- 1 hour
- 2 hours
- 2 hours
- 5 hours
SIPSE Course Design - Module Cycles of 4 Weeks
2.5 hours per week; 10 hours per module; 60 notional hours - 6 core modules

1 week: Online / offline school based facilitation - units 1 & 2

1 week: Classroom try outs

1 week: Online/ offline school based facilitation - units 3 & 4

1 week: Teacher design teams – Design, Teach, Reflect, Re-design
SIPSE Course Structure

Modules:
6 Core Modules/ 4 Enrichment Modules

Levels:
Technology Literacy; Knowledge Deepening

Topics/ Activities:
- ICT -STEM Case Studies (TCK),
- ICT & New Pedagogy for 21L (TPK),
- ICT Practicals (TK),
- ICT Application in STEM Teaching & Learning (TPACK)
SIPSE Module Development

National expert group
ICT & STEM
teacher education,
teacher services,
Teacher champions,
TEIs &
Universities

SIPSE project
technical
technical

technical
technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

technical

t Adapted: CoL, UNESCO, MS, ICT Competency Framework Toolkit, 2015
### Module 1.1: ICT use in Didactic Teaching

<table>
<thead>
<tr>
<th>Technology Literacy Competencies</th>
<th>Proposed Content</th>
<th>Notional Hours (Online)</th>
<th>Resources to be adapted</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers should be able to describe how didactic teaching and ICT can be used to support students' acquisition of school subject matter knowledge. <em>(TL 3.a)</em></td>
<td>Exemplary curriculum materials - ICT resources in didactic lessons to promote interactive learning and engage students in using the resources.</td>
<td>1.0</td>
<td><a href="http://www.sipt4all.org/sipt4all-sipt4all-toolbox">http://www.sipt4all.org/sipt4all-sipt4all-toolbox</a>&lt;br&gt;<a href="http://www.wibi.org/matrix-edtpa-matrix-authentic-adapting-lessons-9-12.php">http://www.wibi.org/matrix-edtpa-matrix-authentic-adapting-lessons-9-12.php</a></td>
<td>Unit 1</td>
</tr>
<tr>
<td><strong>PCK</strong></td>
<td>Using different questioning techniques to promote interactive learning with ICT in lessons</td>
<td>1.5</td>
<td><a href="http://www.tessafrica.net/Secondary-Science">http://www.tessafrica.net/Secondary-Science</a>&lt;br&gt;<a href="http://oea.edu.ac.mw/wiki/DERISchools/YCOSB_Questioning_the_Questions">http://oea.edu.ac.mw/wiki/DERISchools/YCOSB_Questioning_the_Questions</a></td>
<td>Unit 2</td>
</tr>
<tr>
<td><strong>TK</strong></td>
<td>Finding, evaluating, organizing and adapting the right ICT resources (e-content) to meet teaching and learning requirements in STEM teaching</td>
<td>1.0</td>
<td><a href="http://www.pblii.org/gtnew/wp/Files/Legal_Research/PacLII_Use_of_Internet.pdf">http://www.pblii.org/gtnew/wp/Files/Legal_Research/PacLII_Use_of_Internet.pdf</a>&lt;br&gt;<a href="http://phet.colorado.edu/en/simulation/circuit-construction-kit-software-requirements">http://phet.colorado.edu/en/simulation/circuit-construction-kit-software-requirements</a>&lt;br&gt;<a href="http://www.spasta.ac.za">http://www.spasta.ac.za</a> links/teachers.shtml&lt;br&gt;<a href="http://www.khanacademy.org">http://www.khanacademy.org</a></td>
<td>Unit 3</td>
</tr>
<tr>
<td><strong>TPACK</strong></td>
<td>Plan-teach reflect: Classroom activities using presentation, e-resources and questioning techniques to increase student participation and interaction in STEM subject teaching</td>
<td>1.5</td>
<td><a href="http://orbit.educ.cam.ac.uk/w/images/9/92/Activity_template.pdf">http://orbit.educ.cam.ac.uk/w/images/9/92/Activity_template.pdf</a></td>
<td>Unit 4</td>
</tr>
</tbody>
</table>
SIPSE Module Development

**Curriculum mapping** - Module Curriculum Objectives, Content, Methodology, Notional Hours – national workshops

**Design** – Instructional design templates ICT-CFT-TPACK-in-practice - national workshops

**Development** - Identification & evaluation of OERs, guided writing, sequencing activities – 1 month

**Delivery** – module production, project technical team & national team - 2 months

**Review** – national team and technical team – 1 month
Assessment

SIPSE ICT-CFT-TPACK-in-practice

Assessment & Evaluation Tools
SIPSE Assessment

**Collaboration Online**
- One chat per module
- One discussion forum per module

**Classroom observation**
- One lesson per module
- One team observation per module

**Portfolio**
- Two “best” items - per module
- Teacher designed lesson plans/e-resources/ reflection journal/ learner assessments

**Team project challenge**
- Whole school review
- ICT vision & strategy, school culture, curriculum integration, professional learning, infrastructure & resources
SIPSE Assessment

Assessment Breakdown

- Collaboration: 20%
- Classroom Observation: 30%
- Portfolio: 40%
- Team Project: 10%
SIPSE M&E Framework - Evaluating 5 Levels of Pilot Implementation

<table>
<thead>
<tr>
<th>1st level</th>
<th>2nd level</th>
<th>3rd level</th>
<th>4th level</th>
<th>5th level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Reaction</td>
<td>Quality of Professional Learning</td>
<td>Organizational Support</td>
<td>Teacher Application</td>
<td>Student Learning &amp; Attitude</td>
</tr>
<tr>
<td>Workshop &amp; online module evaluation</td>
<td>Teacher Self-assessment</td>
<td>School Review</td>
<td>Classroom observations</td>
<td>Student Assessments</td>
</tr>
</tbody>
</table>

Adapted: Guskey 2000
### Toolkit: SIPSE Assessment & Evaluation Tools

#### Name of School

<table>
<thead>
<tr>
<th>Part</th>
<th>Excellent</th>
<th>Product Assessment Criteria</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of context</td>
<td>Answers all relevant questions, clearly and contains other interesting facts or conclusions</td>
<td>Instructional &amp; Technology (ICT)</td>
<td></td>
</tr>
<tr>
<td>Quality of group presentation</td>
<td>Presentation visually and effective, effectively improves the content and does not differ from the content</td>
<td>Technology &amp; Content (TCK)</td>
<td></td>
</tr>
<tr>
<td>Quality of group research</td>
<td>Group can generate, analyze and apply appropriate hypotheses from a variety of sources</td>
<td>Technology &amp; Pedagogy (TPA)</td>
<td></td>
</tr>
<tr>
<td>Quality of group communication</td>
<td>Group members interact, collaborate and work effectively, regularly produce an original project</td>
<td>Teacher Observers and MTS</td>
<td></td>
</tr>
</tbody>
</table>

#### IPACk Assessment 1

<table>
<thead>
<tr>
<th>Circle at appropriate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Observers’ comments</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main observation areas</th>
<th>What did you see?</th>
<th>What did you think? (worked well/less well)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Content (C):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Lesson topic learning objectives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Main story or problem or information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Work expects impact - more task, task, process, goal, product, evaluation &amp; conclusion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Technology &amp; Content (TCK):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• ICT (presentation or word or spreadsheet or other)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Non-ICT (continuous, interconnected, tools, media assessment, creative, innovative, innovative, innovative)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Technology &amp; Pedagogy (TPA):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Group work (constructive group work strategies, reflection, management)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Project based (peer, group, peer, team, model, product, evaluation &amp; conclusion)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Adapted: College of William and Mary, School of Education (2015)
Example Level 4: Teacher Application of ICT

**Teacher Didactic Lesson Plan Review**
Assessed by Master Trainers
Kenya (N=52); Tanzania (N=47)
May 2014

![Bar chart showing teacher application scores in Kenya and Tanzania.](chart.png)

**Indicators:** Very Good = 4; Good = 3; Satisfactory = 2; Fair = 1
<table>
<thead>
<tr>
<th>Teacher Mary –</th>
<th>Analysis – describe current practice</th>
<th>PCK</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are topics that are closed (with questioning), like in Chemistry, because they are facts …</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher Stephen</th>
<th>Analysis - identify problem with current practice</th>
<th>PCK (gap)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) I will expect definite answers….</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) we need to take account that we cannot capture everything 100% in the one particular lesson…</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) because we have to be realistic…</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher John</th>
<th>Design – propose new practice</th>
<th>PCK (refine)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) The difference will come in on the methodology…</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) How do you arrive at it…</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher Judith</th>
<th>Analysis – justify new practice</th>
<th>PCK (refine)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) When we say that when we are questioning we only restrict ourselves to closed questioning…</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) I think we will be making a mistake…</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) I think that the knowledge that we give the students or the knowledge that we acquire,…</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) we are supposed to apply it somewhere…</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) so high order thinking questions must be there, almost in all, in all subjects…</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Framework adapted from: Koh, Chai, Wong & Hong, (2015); Teacher names replaced with pseudonyms
### Seeding a new design frame

**School Teacher Design Team Post-Lesson Reflection: Transcript**

<table>
<thead>
<tr>
<th>Teacher Mary –</th>
<th>Process Based</th>
<th>Knowledge based</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Analysis</strong> – describe current practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>There are topics that are closed (with questioning), like in Chemistry, because they are facts …</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher Stephen</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Analysis</strong> - identify problem with current practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) <em>I will expect definite answers….</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) <em>we need to take account that we cannot capture everything 100% in the one particular lesson…</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) <em>because we have to be realistic…</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher John</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Design</strong> – propose new practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) <em>The difference will come in on the methodology…</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) <em>How do you arrive at it…</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher Judith</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Analysis</strong> – justify new practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) <em>When we say that when we are questioning we only restrict ourselves to closed questioning…</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) <em>I think we will be making a mistake…</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) <em>I think that the knowledge that we give the students or the knowledge that we acquire,…</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) <em>we are supposed to apply it somewhere…</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) <em>so high order thinking questions must be there, almost in all, in all subjects…</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Framework adapted from: Koh, Chai, Wong & Hong, (2015); Teacher names replaced with pseudonyms
<table>
<thead>
<tr>
<th>Teacher Mary –</th>
<th>Analysis – describe current practice</th>
<th>PCK</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are topics that are closed (with questioning), like in Chemistry, because they are facts …</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Teacher Stephen

- a) I will expect definite answers.…
- b) we need to take account that we cannot capture everything 100% in the one particular lesson…
- c) because we have to be realistic…

<table>
<thead>
<tr>
<th>Teacher John</th>
<th>Design – propose new practice</th>
<th>PCK (refine)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) The difference will come in on the methodology…</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) How do you arrive at it…</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Teacher Judith

- a) When we say that when we are questioning we only restrict ourselves to closed questioning…
- b) I think we will be making a mistake…
- c) I think that the knowledge that we give the students or the knowledge that we acquire,…
- d) we are supposed to apply it somewhere…
- e) so high order thinking questions must be there, almost in all, in all subjects…

Analysis – justify new practice  PCK (refine)

Framework adapted from: Koh, Chai, Wong & Hong, (2015); Teacher names replaced with pseudonyms
What does it mean?

Review of lesson plans and post lesson reflection shows teachers

• growing in confidence in their **lesson design for technology use to support STEM didactic content**

• exploring and problem solving with new design frames **towards integrating new pedagogical strategies** for 21st century learning in classroom practice
SIPSE M&E Framework - Outcomes, Indicators, Data Sources

Anticipated Outcomes
- **Outcome 4**: Phased development of teacher capacity
- ‘technology literacy’
- ‘knowledge deepening’
- levels of ICT integration in STEM

Indicative Indicators
- **Year 1**: teachers score a mean of 2.5 on 0-4 TPACK scale
- At least 90% of teachers achieve ‘technology literacy’ level certification

Date Sources
- Teacher lesson plans & resources
- Teacher observation assessments
- Post-lesson reflections in teacher design team
- Teacher e-portfolios
- Teacher most significant outcome stories
Impact

SIPSE ICT-CFT-TPACK-in-practice

Model Evaluation & Dissemination
External Evaluation 2015

Effectiveness:

• The SIPSE model of
  • introducing key concepts during workshops
  • addressing them in-depth during online training, and
  • supporting the application and practice through master trainer visits in the classrooms
• increased the effectiveness of the project at the classroom practice level.
Accreditation

• GESCI is not an accrediting body
• GESCI is working with MoEs, Institutions and Strategic Partners
  • to accredit the SIPSE course
  • to integrate the contextualized framework into national frameworks for teacher development
  • build a database of modules aligned to ICT-CFT for STEM teaching and learning at secondary level
Impact
Model Sharing & Knowledge Building 2015

• **Kenya & Tanzania:** MEL Reports, Policy Forums Regional & National, Policy Recommendations Dissemination, May-October, 2015

• **UNESCO Bangkok:** Case Studies, Regional Meeting, October 2015

• **UNESCO East Africa Region:** ICT-CFT Colloquium, Knowledge Sharing Regional Partners, Integration of SIPSE Case Study / Policy Toolkit, November 2015
SIPSE Phase 2: 2016-2020
African Digital Schools Initiative (ADSI)

UNESCO ICT Competencies

- Teacher ICT Competency Certification
- Knowledge Creation
- Knowledge Deepening
- Technology Literacy

Progressive Pathway to Whole-School ICT Integration

ADSI Digital Schools of Excellence and Awards Framework
## Access and target levels: Building in ownership and capacity at every system level

<table>
<thead>
<tr>
<th>Participants</th>
<th>Members</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>National Planning Partners Expert Working Groups</strong></td>
<td>Ministries &amp; Departments, Universities, TEIs, TVEs, Schools, Subject experts, etc.</td>
<td>Needs assessment; curriculum review; module revisions/ development; exemplary curriculum materials/ competency framework contextualization and mainstreaming</td>
</tr>
<tr>
<td><strong>Project coordinators Regional, district &amp; county stakeholders</strong></td>
<td>Champions, Educators TEIs, Subject technical support county Directorates/DEDs</td>
<td>Online facilitation; school visits programme</td>
</tr>
<tr>
<td><strong>School level 1: Heads</strong></td>
<td>Heads of ADSI school cluster zones</td>
<td>School ICT Review, Policy and Planning; Digital schools</td>
</tr>
<tr>
<td><strong>School level 2: School Coordinators</strong></td>
<td>ADSI team leads</td>
<td>School based support – school based practice &amp; reflection workshops; video production &amp; review</td>
</tr>
<tr>
<td><strong>School level 3: Teachers</strong></td>
<td>STEM teacher design teams</td>
<td>Lesson planning &amp; resources; peer-to-peer observations; school based seminars</td>
</tr>
<tr>
<td><strong>School level 4: Digital schools</strong></td>
<td>School-head leads</td>
<td>School cluster seminars; benchmark visits</td>
</tr>
<tr>
<td><strong>Strategic partnership</strong></td>
<td>MCF, UNESCO (East Africa, Bangkok, IICBA), CoL, ISTE, INTEL, MS</td>
<td>Sharing of lessons learned; informing ICT-TED policy and strategy on emerging good practice</td>
</tr>
</tbody>
</table>
References


• College of William and Mary, School of Education (2015) *TPACK Assessments*, retrieved from: [http://activitytypes.wmwikis.net/Assessments](http://activitytypes.wmwikis.net/Assessments)


