Optimizing benefits of ICT for education in developing Asia

A slide show based on the
ICT4Education Research Dissemination Event by
LIRNEasia held on 2016 Nov 26, 2015, at the
Committee Room E, BMICH, Colombo, Sri Lanka
Review questions

- What do we know about integration of ICT in education in the Developed world?
- What do we know about integration of ICT in education in the Developing Asia?
- How can current ICT4Education policy and practice further inform policy and practice in Sri Lanka?
Agenda

0945-1030  **What do we know about integration of ICT in education in the developed world?**
Sujata Gamage, Team Leader, Human Capital Research Program, LIRNEasia

1045-1245  **What can we learn from ICT in education initiatives in developing Asia?**
Singapore (Longkai Wu, Research Scientist, Office of Education Research, NIE, Singapore)
Bangladesh (Anir Chowdhury, Access to Information Unit, PMO, Bangladesh)
Sri Lanka  User Perspective:  Gayani Hurulle, Researcher, LIRNEasia
Web Patashala:  Dumindra Ratnayake, Former CEO, Etisalat
Guru.lk  Kyle Coenraad, Dialog and Hasitha Dela, Headstart
Khan Academy:  Chrishan Pereira, eLearning Consultant, ADB

1245-0130  **Open Forum: Questions, experiences and way forward**
Participants

1. Ahamed Nishadh, ICTA
2. Anir Chowdhury, Digital Bangladesh
3. Anoja Obeysekera, IT consultant
4. Chrishan Pereira, ADB, Khan Academy
5. D. A. Jayalal, NIE, Sri Lanka
6. Dhamitu Kirtisinghe, Mobitel
7. Dumindra Ratnayake, Former CEO, Etisalat
8. G.M. Niel Gunadasa, Director of Education, IT Unit, MOE
9. Gayani Hurulle, LIRNEasia
10. Hasitha Dela, Headstart
11. Ishara Madushanka, Infogate, Kantale
12. Janakie Karunarathna, Microsoft
13. Kamal Abeysinghe, EDEX
14. Kyle Coenraad, Digital Services Dialog Axiata PLC
15. Longkai Wu, NIE, Singapore
16. Nanda Wanninayake, Horizon Lanka, Mahavilachchiya
17. Nimali Baduraliya, Department of Education, Western Province
18. Rohan Samarajiva, LIRNEasia
19. Shirani Elasinghe, Sarvodaya Fusion
20. Sujata Gamage, LIRNEasia
21. Thanaraj Thaiyamuthu, Horizon Campus, Formerly Open University
22. Thushara Silva, Wijeya Newspapers
23. Vishaka Nanayakkara, University of Moratuwa
24. Wasantha Deshapriya, Secretary, Ministry of Telecommunication & Digital Technology
25. Wimal Gunarathna, Department of Education, Western Province
26. Yashinka Jayasinghe Alles, Microsoft
27. Yudhanjaya Wijeratne, WSO2
What do we know about integration of ICT in education in the developed world?

Sujata N Gamage
sujata@lirneasia.net

ICT4Education Research Dissemination Event
2016 Nov 26, Colombo, Sri Lanka
# Types of studies

- **Description**
  - Descriptive statistics, Narratives

- **Exploration of relationships**
  - Causal mechanisms

- **Evaluations (Experimental or Quasi-experimental)**
  - Effect sizes

- **Methodology**
  - Method

- **Review (Systematic or Other)**
  - Summary of reports

**Source:** EPPI-Centre Keywording Strategy for classifying education research version 0.9.7

**Notes:**
- Experimental (RCTs or Randomized controlled trials)
- Quasi-experimental (Non-randomized controlled trials; evaluations of naturally occurring phenomena using suitable comparisons)

**Code:** Evidence for Policy and Practice Information (EPPI)
PICO Framework for analysis
Source: Clinical research literature

- Population
- Intervention
- Control or comparisons
- Outcome
POPULATION: Four types seen in the ICT4Education literature


<table>
<thead>
<tr>
<th></th>
<th>Teachers at home</th>
<th>Students at home</th>
</tr>
</thead>
<tbody>
<tr>
<td>At home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Class</td>
<td>Teachers in class</td>
<td>Students in class</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teachers</th>
<th>Students</th>
</tr>
</thead>
</table>

INTERVENTIONS: Typology of tools

• LEARNING TOOLS
  Curricular: E-text books/ Exercises/Quizzes/Tests and their variations using dedicated Web sites; Broadcasts/Podcasts/You Tube;; Game-based learning tools
  Other: Other learning tools not directly linked a particular curriculum

• COMMUNICATION TOOLS
  Use or email/chat to communicate/share materials or ideas with other students/teachers/or other

• DATA PROCESSING TOOLS
  Word processing; Spreadsheets; Databases; Multimedia tools: PPT/Audio-visual tools for recording and editing; GIS; Data-logging tools

• GAMES
  Action, Adventure, Strategy, Simulations, Role-playing, Puzzles

• OTHER
OUTCOMES
Source: LIRNEasia study*

Learning outcomes can be broadly classified* as:

• Subject competency
• Personal development and
• Citizenship

A detailed PICO framework for ICT4Education initiatives

INTERVENTION
- Learning tools
- Communication tools
- Data Processing tools
- Games
- Other

POPULATION
- Teachers/In class
- Teachers/Out of class
- Students/In class
- Students/Out of class
  With or without CONTROL

OUTCOME
(intended/unintended)
- Subject competency
- Personal development
- Citizenship
(1) Descriptive Statistics/Narratives

Based on the:


- European Commission (2014). The teaching and learning International Survey (TALIS). [http://ec.europa.eu/education/library/reports/2014/talis_en.pdf](http://ec.europa.eu/education/library/reports/2014/talis_en.pdf) (17 countries including Belgium (Flanders); Bulgaria; Czech Republic; Cyprus; Denmark; Estonia; Spain; Finland; France; Croatia; Italy; Latvia; Netherlands; Poland; Portugal; Romania; Sweden; Slovakia; United Kingdom;

ICTs have not yet been as widely adopted in formal education, and where adopted, no improvements can be seen in student learning outcomes in PISA assessments [PISA/OECD, 2015]

In 2012, 96% of 15-year-old students in OECD countries reported that they have a computer at home, but only 72% reported that they use a desktop, laptop or tablet computer at school. Only 42% of students in Korea and 38% of students in Shanghai-China reported that they use computers at school – and Korea and Shanghai-China were among the top performers in the digital reading and computer-based mathematics tests in the OECD Programme for International Student Assessment (PISA) in 2012. By contrast, in countries where it is more common for students to use the Internet at school for schoolwork, students’ performance in reading declined between 2000 and 2012, on average.

These findings, based on an analysis of PISA [Program for International Student Assessments] data, tell us that, despite the pervasiveness of information and communication technologies (ICT) in our daily lives, these technologies have not yet been as widely adopted in formal education. But where they are used in the classroom, their impact on student performance is mixed, at best. In fact, PISA results show no appreciable improvements in student achievement in reading, mathematics or science in the countries that had invested heavily in ICT for education.
Learning outcomes increase from no use of ICT in class to some use, but, decrease with higher levels of use.
Time spent online by students, minutes per day

Students spend 25 minutes online per day at school, but 104 minutes per day at home on weekdays and 138 minutes per day on weekends, on average (Finland and Asian countries are below the OECD average)

<table>
<thead>
<tr>
<th></th>
<th>In Class</th>
<th>Out of Class, Weekdays</th>
<th>Out of Class, Weekends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>58</td>
<td>130</td>
<td>158</td>
</tr>
<tr>
<td>Denmark</td>
<td>48</td>
<td>136</td>
<td>177</td>
</tr>
<tr>
<td>Norway</td>
<td>24</td>
<td>136</td>
<td>170</td>
</tr>
<tr>
<td>OECD Average</td>
<td>25</td>
<td>104</td>
<td>138</td>
</tr>
<tr>
<td>Singapore</td>
<td>20</td>
<td>102</td>
<td>152</td>
</tr>
<tr>
<td>Finland</td>
<td>18</td>
<td>99</td>
<td>130</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>12</td>
<td>111</td>
<td>164</td>
</tr>
<tr>
<td>South Korea</td>
<td>8</td>
<td>59</td>
<td>94</td>
</tr>
</tbody>
</table>
Browse the Internet for schoolwork (%) at least once a week
42-55% of PISA teachers or students browsed the Internet at least once a week for schoolwork at home or school, on average

<table>
<thead>
<tr>
<th>Country</th>
<th>Teachers</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At Home</td>
<td>In class</td>
</tr>
<tr>
<td>Australia</td>
<td>-</td>
<td>49</td>
</tr>
<tr>
<td>Denmark</td>
<td>-</td>
<td>66</td>
</tr>
<tr>
<td>Norway</td>
<td>-</td>
<td>82</td>
</tr>
<tr>
<td>PISA Average</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Finland</td>
<td>-</td>
<td>31</td>
</tr>
<tr>
<td>Singapore</td>
<td>-</td>
<td>59</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>-</td>
<td>48</td>
</tr>
<tr>
<td>South Korea</td>
<td>-</td>
<td>56</td>
</tr>
</tbody>
</table>
### Students’ use other than for Internet browsing is limited

**At school:** Information use: 12-19%; Communication use, 19-21%

**At home:** Information use: 30%; Communication use, 33-38%

<table>
<thead>
<tr>
<th>Out of school</th>
<th>Teacher’s use of ICT at home (%) at least once a week for:</th>
<th>Students’ use of ICT at home (%) at least once a week for:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>45 Browsing the Internet</td>
<td>55 Browsing the Internet</td>
</tr>
<tr>
<td></td>
<td>45 Browsing to prepare lessons</td>
<td>38 Email other students about schoolwork</td>
</tr>
<tr>
<td></td>
<td>44 Browsing for material for lessons</td>
<td>33 Share school related materials with other students</td>
</tr>
<tr>
<td></td>
<td>46 Preparing tasks for students</td>
<td>30 Download/upload from school site</td>
</tr>
<tr>
<td></td>
<td>32 Preparing presentations</td>
<td>30 Check school web site</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minutes per day Students’ spend on browsing the Internet:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>104 Weekday</td>
</tr>
<tr>
<td></td>
<td></td>
<td>125 Weekend</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>At School</th>
<th>Teachers’ use of ICT at school (%) at least once a week for:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>45 Browsing the Internet</td>
</tr>
<tr>
<td></td>
<td>46 Do projects/classwork (%) at least once a week</td>
</tr>
<tr>
<td></td>
<td>Students’ use of ICT at school (%) at least once a week for:</td>
</tr>
<tr>
<td></td>
<td>42 Browsing the Internet</td>
</tr>
<tr>
<td></td>
<td>21 Use email at school</td>
</tr>
<tr>
<td></td>
<td>19 Download/upload/browse material from school site</td>
</tr>
<tr>
<td></td>
<td>19 Chat online</td>
</tr>
<tr>
<td></td>
<td>18 Practice/Drilling for foreign language/math</td>
</tr>
<tr>
<td></td>
<td>12 Post work on school website</td>
</tr>
<tr>
<td></td>
<td>11 Play simulations</td>
</tr>
<tr>
<td></td>
<td>Minutes per day Students’ spend on browsing the Internet:</td>
</tr>
<tr>
<td></td>
<td>25 Weekday</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>125</td>
</tr>
</tbody>
</table>
Summary of observations from Descriptive reports

- Browsing the Internet is the most prevalent activity by teachers or students in class or out of class.
- Students spend 25 minutes online per day at school, but 104 minutes per day at home on weekdays.
- Students’ use of ICT for school work is largely limited to Internet browsing (more so at home than at school).
- Learning outcomes increase from no use of ICT in class to some use, but, decrease with higher levels of use.
Review question arising from descriptive reports

- How can we get more out of the use of technology in the classroom?
There are many studies/reviews on evaluating the effects of ICT on learning outcomes in K-12 classrooms*, but, few on what happens in side the classroom ‘black box’

Common sense dictates that the ‘acceptance and use of ICTs’ by teachers, a process that happens inside the ‘black box,’ is a prerequisite for student learning outcomes, but, there are no reviews of studies regarding this ‘black box.’
(2) A systematic review of the literature for uncovering effect sizes and/or causal mechanisms on “Strategies for training/supporting teachers for integration of ICT in K-12 classrooms”

Do not quote because systematic review results reported here are pending review by EPPI.
Review questions

- What strategies are used to train and/or support teachers to integrate ICT in the classroom?
- How has each strategy impacted the success of teachers in integrating ICT in the teaching-learning process?
Theory of change

From the unified theory on technology acceptance and use (UTTAU) by Venkatesh (2003), a variation of the Technology Acceptance Model (TAM)

NOTES:
1. PERFORMANCE EXPECTANCY = Perceptions of usefulness; EFFORT EXPECTANCY = Perceptions of ease of use
2. CAUSAL FACTORS: Perceptions of usefulness, Ease of use, Social influence and Facilitating conditions
3. ATTRIBUTES OF THE POPULATION & INFLUENCING CONDITIONS: Gender, Age, Experience, Voluntariness of use and Other
Systematic Review Process

- **SEARCH**  Electronic databases/ Hand search /Citations/ Contact/Unknown
- **SCREEN**  Inclusion/exclusion criteria for relevance to the review question
- **ASSESS**  Risk of bias analysis for quality of studies
- **EXTRACT**  Population/Intervention/Comparison/Outcomes/Causal mechanism
- **SYNTHESIZE**  Effect sizes or relationship estimates
The Systematic Review protocol for ICT use in K-12 classrooms

- **SEARCH**
  - ERIC, EBSCO, SCOPUS, SSCI and Proquest

- **SCREEN1**
  - (1) concern integration of technology in a classroom, school or school system; (2) published in 1990 or after; (3) focus on primary, secondary education; (4) empirical studies that measure technology use in K-12 classrooms

- **SCREEN2**
  - Evaluations: The design is experimental (RCT) or quasi-experimental
  - Explorations: The technology is specified and the TAM theory is used

- **ASSESS**
  - Risk of bias analysis (Sampling bias, Confounding variable bias, Motivation bias, Spill-over bias, Reporting bias and Other biases)

- **SYNTHESIZE**
  - Effect size calculation (1) response ratio and (2) standardized mean difference (SMD)

Please do not quote. Systematic review results reported here are pending review by EPPI.
Results of the screening process

- **SEARCH**
  - 11,419 Reports
  - Eval./Expl./Mthd./Rev./Desc.

- **SCREEN1**
  - 63 Reports
  - 5 Evaluations/ 58 Explorations

- **SCREEN2**
  - 13 Reports
  - 5 Evaluations/ 8 Explorations

- **ASSESS**
  - 9 Reports
  - 2 Evaluations/7 Explorations

- **SYNTHESESIZE**
  - 9 Reports
  - See next few slides for details

Please do not quote. Systematic review results reported here are pending review by EPPI.
Five EVALUATION reports included
with the two reports selected for synthesis with effect size calculation marked with asterisks

<table>
<thead>
<tr>
<th>CITATION- SHORT</th>
<th>CITATION</th>
<th>TECHNOLOGY</th>
</tr>
</thead>
</table>

Please do not quote. Systematic review results reported here are pending review by EPPI.
Sixty three EXPLORATION reports included
Only the seven reports selected for synthesis shown here. Please see the SR report for details on all 63

<table>
<thead>
<tr>
<th>CITATION SHORT</th>
<th>CITATION</th>
<th>Technology</th>
</tr>
</thead>
</table>

Please do not quote. Systematic review results reported here are pending review by EPPI.
## Effect sizes

**Lowther-2003.**

<table>
<thead>
<tr>
<th>Population</th>
<th>Intervention</th>
<th>Control</th>
<th>Outcome</th>
<th>ES Mean (Std. Error)</th>
<th>ES Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students in 12 classes distributed across Grade 5, 6 and 7 and each class with a teacher who received computer integration training</td>
<td>OLPC with 24 hour access to computers for students</td>
<td>9 classes with 5+ computers per class distributed across Grade 5, 6 and 7 and each with a teacher who received computer integration training</td>
<td>Uses technology as a learning tool, Grade 6 (Table 5)</td>
<td>+1.31</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Uses technology as a learning tool, Grade 5 (Table 5)</td>
<td>+1.25</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Level of student attention or interest (Table 5)</td>
<td>+0.89</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Identifies what needs to be known to solve a problem, Grade 5 (Table 8)</td>
<td>+0.45</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Identifies what needs to be known to solve a problem, Grade 6 (Table 8)</td>
<td>+0.45</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Use of higher-level questioning (Table 5)</td>
<td>-1.08</td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1. Uses technology as a learning tool includes uses in Internet research, spreadsheet or database creation, multimedia, CD-ROM, Laser disk; The last four outcomes concern learning outcomes. The last two outcomes are learning outcomes. Included here to demonstrate that effect sizes for learning outcomes can be much smaller than 'technology use' outcomes. 2. For Cohen's d an effect size of 0.2 to 0.3 might be a "small" effect, around 0.5 a "medium" effect and 0.8 to infinity, a "large" effect.[7]:25 (Cohen's d might be larger than one.)
## Effect sizes

**Lowther-2008.**

<table>
<thead>
<tr>
<th>Population</th>
<th>Intervention</th>
<th>Control</th>
<th>Outcomes</th>
<th>ES Mean (Std. Error)</th>
<th>ES Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approximately quarter of a sample of 28,735 students and 1,746 teachers in 26 schools with no technology coaches</td>
<td>On-site technology coaches to prepare teachers to create lessons that engage students in critical thinking and use of computers as tools</td>
<td>Approximately quarter of a sample of 28,735 students and 1,746 teachers in 26 schools with no technology coaches</td>
<td>Technology as a learning tool or resource, Launch 1 (SOM, Table 4)</td>
<td>+1.15</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Technology as a learning tool or resource, Launch 2 (SOM, Table 4)</td>
<td>+0.91</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Meaningful use of computers, Launch 1 (Table 7, OCU)</td>
<td>+1.06</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Meaningful use of computers, Launch 2 (Table 7, OCU)</td>
<td>+0.49</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Higher level questioning strategies, Launch 2 (Table 5, RSCA)</td>
<td>+0.21</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Higher level questioning strategies, Launch 1 (Table 5, RSCA)</td>
<td>-0.21</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**

1. Uses technology as a learning tool: includes uses in Internet research, spreadsheet or database creation, multimedia, CD-ROM, Laser disk; The last two outcomes are learning outcomes. Included here to demonstrate that effect sizes for learning outcomes can be much smaller than ‘technology use’ outcomes.

2. Meaningful use of computers: Based on observations of the extent to which technology was integrated with teaching and learning.
### Relationship of PU to PEOu

Based on eight studies from seven reports that explore the relationship between the Use of technology by teachers and their perceptions of Ease of use (PEoU), Usefulness (PU), Social influence and Facilitating conditions.; Meaningful calculations were possible only for the PU/PEoU ratio.

<table>
<thead>
<tr>
<th>Paper</th>
<th>Intervention</th>
<th>RoB</th>
<th>ES (PU)/PEoU Mean *(Std Error)</th>
<th>ES (PU)/PEoU Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Van Acker-2013-Nethland</td>
<td>Digital learning materials (DLM)</td>
<td>Low</td>
<td>2.79 (0.05)</td>
<td>2.7-2.9</td>
</tr>
<tr>
<td>Kim-2009-Korea</td>
<td>Digital text book pilot</td>
<td>Med</td>
<td>2.70 (0.70)</td>
<td>1.3-4.1</td>
</tr>
<tr>
<td>Lay-2013-Taiwan</td>
<td>GIS for geography curriculum</td>
<td>Low</td>
<td>2.65 (0.07)</td>
<td>2.5-2.8</td>
</tr>
<tr>
<td>Pynoo-2012-Belgium</td>
<td>Klasscement portal for teachers</td>
<td>Med</td>
<td>2.09 (0.06)</td>
<td>2.0-2.2</td>
</tr>
<tr>
<td>Teo-2001-Singapore</td>
<td>ICT use by Algebra teachers</td>
<td>Low</td>
<td>2.05 (0.20)</td>
<td>1.6-2.4</td>
</tr>
<tr>
<td>DeSmet-2012-Belgium</td>
<td>Learning management system (LMS) for Communication use</td>
<td>Low</td>
<td>1.29 (0.09)</td>
<td>1.1-1.5</td>
</tr>
<tr>
<td>DeSmet-2012-Belgium</td>
<td>Learning management system (LMS) for information use</td>
<td>Low</td>
<td>0.89 (0.08)</td>
<td>0.7-1.0</td>
</tr>
<tr>
<td>Pynoo-2011-Belgium</td>
<td>Digital learning environment (DLE)</td>
<td>Low</td>
<td>0.50 (0.21)</td>
<td>0.1-0.9</td>
</tr>
</tbody>
</table>
Summary of results from the systematic review of EVALUATIONs and EXPLORATIONS on “Strategies for training or supporting teachers to integrate a technology in the classroom

A search for reports relating to technology use in K-12 classrooms and published between 1990 and July 2014 yielded 11,419 reports. Of these, 64 reports met inclusion criteria relevant to the review topic, but, of those only 2 evaluation reports and 7 reports exploring relationships were identified as of sufficient internal and external validity for calculating the effect size of strategies to train or support teachers. (Surprisingly, All five evaluation reports were from the 2001-2010 period. there were no evaluation reports for the 2011 to 2015 period.)

The two evaluation reports show that teacher training along with facilitating conditions - in the form of (1) one laptop per child and (2) on-site coaches - increase technology integration by effect sizes ranging from +0.49 to +1.31 compared to the control with no such facilitating conditions.

The exploration reports showed that in introducing a specific technology which is integrated into the curriculum, the perceptions of teachers regarding the usefulness of particular technology is twice as important as their perception of the ease of use of that particular technology. It is difficult to make generalizations when the technology intervention is not specified.

Please do not quote. Systematic review results reported here are pending review by EPPI.
What do we know about integration of ICT in education in Developing Asia?

Sujata N Gamage
sujata@lirneasia.net

ICT4Education Research Dissemination Event
2016 Nov 26, Colombo, Sri Lanka
Bangladesh

Highlight

• Teachers’ wanted tools to search and incorporate digital materials in their lessons. Teacher portal for and by teachers containing lesson plans incorporating is one success story.

Singapore

Highlight

• Scaling up innovations by NIE is a slow and expensive process

Sri Lanka

• Online e-texts or e-tutorials (e.g. E-thaksalawa, Web Patashala, guru.lk and Khan academy) are available, but, Internet access is only in 11.4% of households
• DVDs of tutorials are available through Khan academy-Sinhala/Tamil, Sri Lanka
• Broadcast tutorials available free for schools through Nenasa broadcasts from Dialog
• There is no effort to change the teaching and learning process from the current content focus to a more holistic education.
Implications for ICT use in education

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A PICO-ToC Framework for planning, implementing and evaluating

**INTERVENTION**
- Learning tools
- Communication tools
- Data Processing tools
- Games
- Other

**POPULATION**
- Teachers/In class
- Teachers/Out of class
- Students/In class
- Students/Out of class With or without
**CONTROL/COMPARISON**

**OUTCOME**
(Intended/Unintended)
- Subject competency
- Personal development
- Citizenship of students

**THEORY OF CHANGE (ToC)**

Causal Factors: Ease of Use; Usefulness; Social influence and Facilitating conditions; Attributes of the population: Age, Gender, Experience, Voluntariness and Other; Other conditions with power to influence the process

Issues for consideration in ICT4Education initiatives

- Always make sure that you understand the Population, Intervention and the Outcomes (PIOs) concerned and the Theory of Change (ToC) linking the intervention to the outcome.

- Note that learning outcomes are possible only if the technology is used in the classroom in the teaching and learning process. Therefore, your causal mechanism should always include ‘technology use’ as an intermediate step.

- Evaluate both technology use and learning outcomes.

  LIRNEasia’s systematic review with two evaluation reports reveals positive outcomes with effect sizes of +1.3 to 1.6 when in-service training was accompanied by OLPC and effect sizes of 0.49 to 1.15 when teachers were provided with on-site technology coaches.

- If teachers are convinced of the usefulness of a technology, usability can be a secondary concern.

  LIRNEasia’s systematic review using four exploration studies show that Perception of usefulness can be twice as important as perception of ease of use in acceptance and use of ICT by teachers.
Implications for ICT use in education in Sri Lanka

ICT4Education Research Dissemination Event
2016 Nov 26, Colombo, Sri Lanka
Sri Parakramabahu Maha Vidyalaya, Colombo 5, ~300 students
Unused infrastructure, green space and families/students ready to stay after school for tutoring
Window of opportunity in Sri Lanka

A possible window of opportunity for ICT4Education initiatives in Sri Lanka or in the developing world is to focus on students’ use after class where,

• POPULATION: Children from disadvantaged communities staying after school in school premises

• INTERVENTION: Guided use of a variety of ICT tools, increasing from ‘no use’ to ‘some use’ and staying within a ‘safe’ range of ICT use within a comprehensive program that includes other physical activities

• OUTCOMES: Subject competency plus personal development and citizenship
Thank you