

Computing and the Developing World

CSEP 590B, Spring 2008

Lecture 1

Richard Anderson

Today's class

- Introduction
- Logistics
- Background
- Key ideas
- Approaches

What is "Computing for the Developing World"?

Course Staff

- Richard Anderson
 - In Computer Science and Engr at UW since 1986
 - Visiting Prof at IISc, Bangalore, 1993-1994
 - Research: Educational Technology, Computing in the Developing World
- Emma Rose
 - PhD Student, Technical Communication
 - Advised by Prof. Beth Kolko
 - Researching mobile phone use and application design in Kyrgyzstan

Course Workload

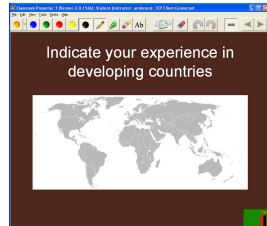
- Weekly Reading Assignments
 - Moderate amount, but you are expected to read the papers before class!
- Weekly Writing/Research Assignments
 - Due at 6pm, Wednesdays, by electronic submission
 - Late Assignments: minus 10% per day
 - Seven of nine assignments must be completed
- Two book reviews

Educational Technology

- Video conferenced class between UW and Redmond
- Plans to include Lahore University of Management Science, Pakistan
- Archived lectures
 - But please attend class, and participate!
- Use of classroom technology
 - Support Active Learning
 - Encourage participation from remote students

Classroom Presenter

- Tablet PC based classroom interaction system
- Student submission model
- Academic Freeware



classroompresenter.cs.washington.edu

Connection Instructions

- Download and install application from classroompresenter.cs.washington.edu
 - Install build 1582
- Start Classroom Presenter 3
- Selected “Networked Student”
- Choose “Advanced Connection Options”
- Select “Connect to TCP Server . . .”
- Enter `sydney2.dyn.cs.washington.edu`
- Press “Join” button when highlighted

Indicate your experience in
developing countries



Africa



South Asia



Computing and the Developing World

- How can computing technology address the problems of the world's poor?
- Computing Focus
 - Develop and deploy technology
 - Engineering, not theory
- Measure of success / impact
 - Whether projects address human needs

Outside the scope of this course

- International Development
- Public Policy
- Poverty
- Economics

Why might “computing for the developing world” be a bad idea?



Background

- Economic Trends
- Technology Trends
- Problem Domains
- Landscape

Economic Trends

- Rapid, world wide economic growth
- Gap between rich and poor growing

Simplified Development Model

- Take-off and convergence
- Poverty Traps

Technology Trends

- Exponential improvement in price/performance + exponential increases in income = rapid adoption
- Technological leap frogging

Key technologies

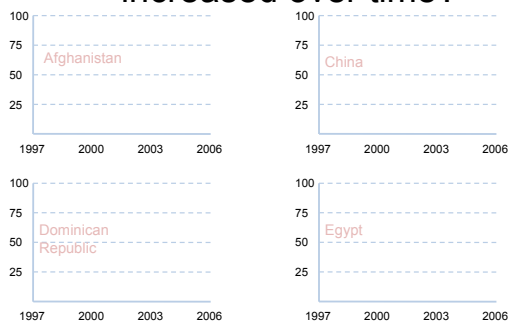
- Computers
 - Hardware
 - Software
- Networking
- Communication
- Physical Infrastructure

Cell Phone Usage

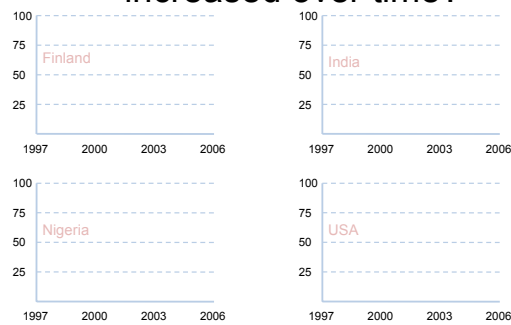


- The worlds leading Information and Communication technology

How has cell phone usage increased over time?



How has cell phone usage increased over time?



Problem Domains

- Health
- Education
- Livelihood

Global Health Challenges

- Basic Health Care
 - Life Expectancy: Zambia 43 yrs, Germany 79 yrs
 - Infant Mortality: Niger 109, Italy 5
- Control of Major Diseases
 - HIV/Aids: Namibia 20%, Canada 0.3%
 - Malaria: 500M infections, 2M deaths per year
- Improved Health Practices
 - 1.1 B people lack access to safe drinking water

Education

- Literacy Rates
 - Mali 19%, Pakistan 49%, Laos 69%
- School Attendance, Primary Enrolment
 - Somalia 17%, Sudan 60%, Congo 88%,
– India 116%, Rwanda 120%, Cambodia 134%
- Teacher Absenteeism
- Language Study
- Vocational Training

Livelihood

- “The reason most poor people are poor is because they don’t have enough money”
- 180 Million Smallholder Farmers in Sub-Saharan Africa earning under 1\$ a day
- Costs of being poor
 - Many goods more expensive for poor
- In Africa the informal sector accounts for 20% of the GDP and employs 60% of the urban workforce

UN Millennium Development Goals

- Eradicate extreme poverty and hunger
- Achieve universal primary education
- Promote gender equality and empower women
- Reduce child mortality
- Improve maternal health
- Combat HIV/AIDS, malaria and other diseases
- Ensure environmental sustainability
- Develop a global partnership for development

Landscape

- Who are the main players in this field?
- Academic community
- Industry
- Government
 - National
 - World
- NGO’s
- Foundations

Donor Conditions

- Examples:
 - Projects must be directed towards countries with good governance
 - Projects must have measurable impacts and attain them
 - Projects must have the potential to be scaled up to serve a large number of people

Emerging Market vs. ICTD

- Is there a distinction between “computing for emerging markets” and “information and communication technology for development”?

Book Reviews

- Read two books from the current “development literature”
- Write a short review of each that connects the book to the topics of this course
- Deadlines:
 - First review: April 30
 - Second review: June 4

Book List

- The White Man's Burden: Why the West's Efforts to Aid the Rest Have Done So Much Ill and So Little Good by William Easterly
- The Elusive Quest for Growth: Economists' Adventures and Misadventures in the Tropics by William Easterly
- The End of Poverty: Economic Possibilities for Our Time by Jeffrey Sachs
- Common Wealth: Economics for a Crowded Planet by Jeffrey Sachs
- The Bottom Billion: Why the Poorest Countries are Failing and What Can Be Done About It by Paul Collier
- A Farewell to Alms: A Brief Economic History of the World by Gregory Clark
- In Spite of the Gods: The Rise of Modern India by Edward Luce
- The Fate of Africa: A History of Fifty Years of Independence by Martin Meredith

Book List (cont.)

- Infections and Inequalities: The Modern Plagues by Paul Farmer
- Creating a World Without Poverty: Social Business and the Future of Capitalism by Muhammad Yunus
- Banker To The Poor: Micro-Lending and the Battle Against World Poverty by Muhammad Yunus
- Out of Poverty: What Works When Traditional Approaches Fail by Paul Polak
- Guns, Germs, and Steel: The Fates of Human Societies by Jared Diamond
- The Fortune at the Bottom of the Pyramid: Eradicating Poverty Through Profits by CK Prahalad
- Designing an Architecture for Delivering Mobile Information Services to the Rural Developing World by Tapan S. Parikh

Class Activity

“Reduce by half the proportion of people without sustainable access to safe drinking water” [Millennium Development Goals]

How can computing technology be used to increase access to safe drinking water?

Propose three ideas for using ICT to improve access to safe drinking water

- 1.
- 2.
- 3.



Key themes in Computing for the Developing World

Resource Constraints / Cost Realism

- Defining nature of the domain is bound on cost
- Economics are fundamental

Electrical and physical infrastructure

- “The utility of the computers is diminished by the lack of power”
- Off the grid
- Irregular availability of power
- Poor quality power

Can't wish away constraints

Negative Results: Valid & Important

- Understanding why things don't work is important
- Avoid repeating same mistakes

Human Element

Different Usage Models

- Don't expect usage models will be the same as in the developed world

Mediated Use of Technology

- Involving people in solutions is important
- Labor often readily available

Hostile PC Infrastructure

- Every flash drive in Africa is infected by viruses. WHY???



Computing Realities

- Poor computing practices
- Older hardware
- Software of dubious provenance
- Difficulty of getting updates

Language and Culture

Sustainability

- Upkeep and business model

Potential for Scale

- Could a project be replicated to address the problem on a broad scale
- Additional set of issues in thinking big

General Approaches

- Relatively few ideas, reproduced in different ways
- Information dissemination and information collection is dominant

Kiosk

- Computer + Internet Access
- Sell variety of services

What services would you offer to sustain a computer kiosk in

1. Redmond, WA
2. Toppenish, WA
3. Rural Zambia



Real time communication

- Distance Learning
- Telemedicine

Low cost PC deployment

- Low cost devices
- Target particular domains

Mobile data collection and activity support

- Activities based on collecting data or delivering services based on data
 - Mobile device
 - Collection and transmission of data

Sensor Networks

- Low cost sensors
- Radio communication
- Monitoring applications

Cell phone data communication

- SMS or other formats for transmitting data using cell phone networks

Summary

- What were the most important ideas from today's lecture?

