

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

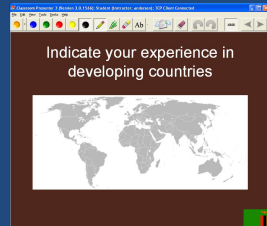
- Weekly Reading Assignments
 - Moderate amount, but you are expected to read the papers before class!
- Weekly Writing/Research Assignments
 - Due at 6pm, Wednesdays, by electronic submission
 - Late Assignments: minus 10% per day
 - Seven of nine assignments must be completed
- Two book reviews

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

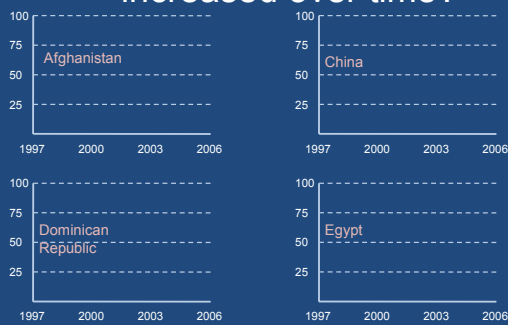
- Computers
 - Hardware
 - Software
- Networking
- Communication
- Physical Infrastructure

Cell Phone Usage

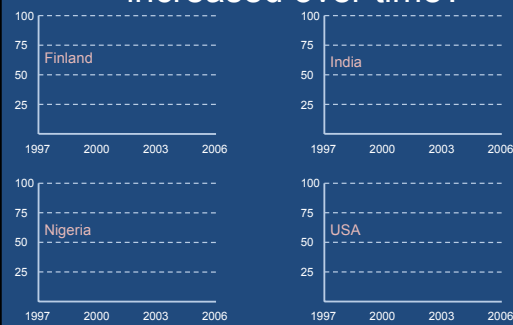
- The worlds leading Information and Communication technology



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?

