Using Technologies towards Education for All

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Outline

- Challenges of Engineering Education in India
- Computers in Schools
- Rural Education

Engineering Education in India

- 1984
  - 100 colleges
  - 30,000 ug students enroll in a year
    - Tremendous urge for professional education
  - 12000 teachers at 1:10 ratio of teacher : student
    - Reasonable quality teachers available
- Today
  - 1500 colleges: private colleges allowed in 1984
  - 400,000 ug students enroll in a year
  - 160,000 teachers required at 1:10 ratio
    - Quality a major challenge: good teachers not available
    - Often fresh graduates become teachers
    - Industry need to spend too much time in training

Scaling Challenges

- 400K Engineering students graduate every year
- Large Enough for India to become R&D and service House for the World
- Key Lacunae : inadequate training
- Key Challenge: Overcome this Bottleneck

Past Efforts

- QIP programs and Short term courses
- For example
  - Joint Telematics Group conducted a STC every six months for 15 years (1987-2002)
    - trained nearly 1000 teachers in Communications
    - some improvement in tier-two institutions
    - but with fast changing Communications field
      - leaves much to be desired
- Some video courses developed
  - limited impact because of dead material

TeNeT Group's Efforts

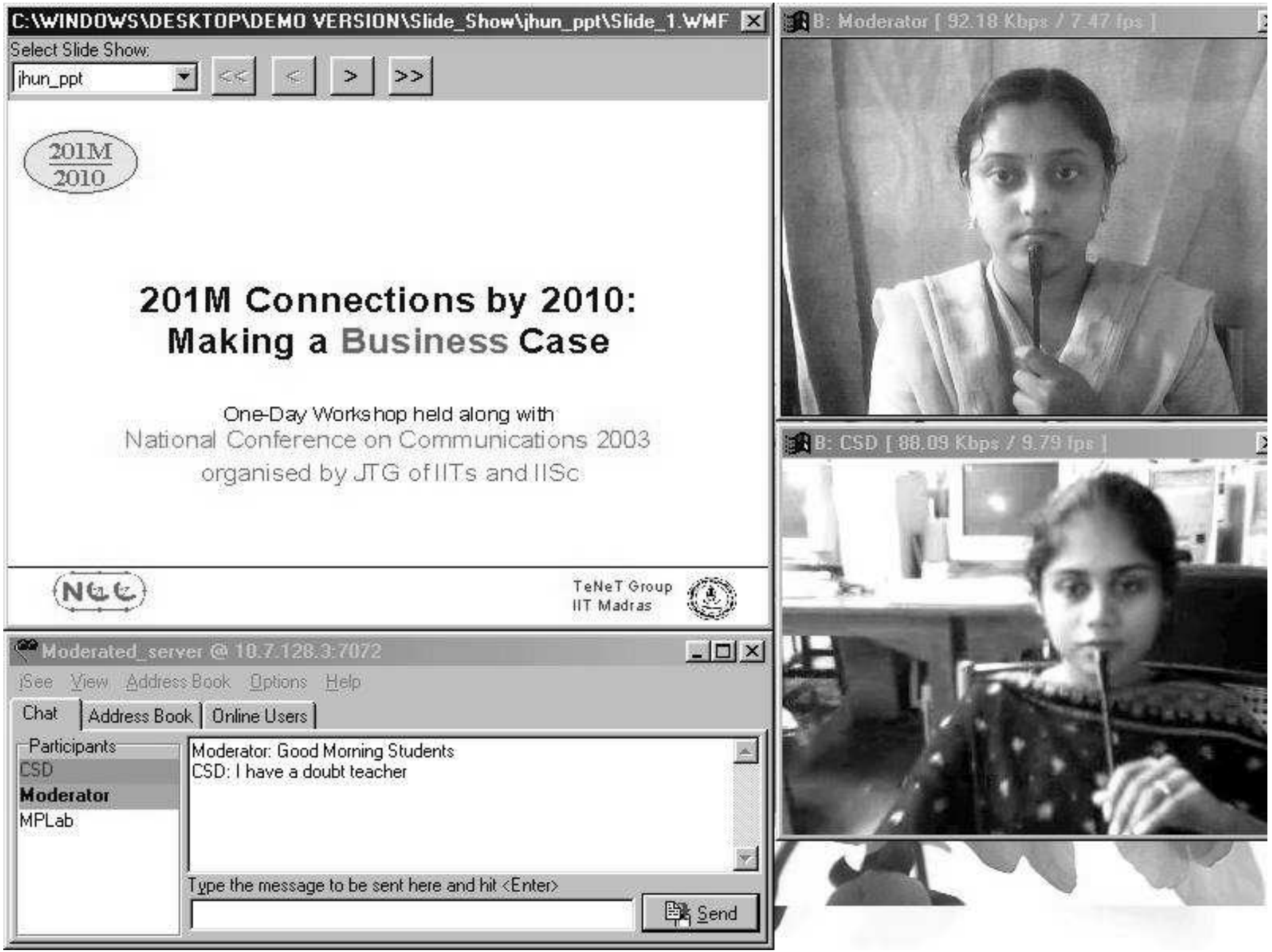
- Conceived a program in 2000
  - to directly provide training to Final year Students / fresh graduates from nearby Engineering College
    - courses in evenings, in summers and winters
    - are different from regular courses
      - focus on concepts and practice
        - must excite students
      - aim to reduce the training time in Industry from one year to three months

Our Experience

- Usha Martin Academy of Communication Technology
  - four Telecom and Networking programs of 80 hours each
  - trained over 1000 students per year
- ADI-IITM DSP Learning Center
  - 100 hour DSP programming course
    - have trained 800 students every year for last four years
- Students Emerge with tremendous confidence
  - Communications and Signal Processing is in their grasp
- But can it scale?

Much Higher Impact Possible

- With Internet
  - Internet based Courses and Live Lecture Web-cast
    - Good teachers not available in numbers
    - a student attending even one top-quality live lecture a day will gain significantly
  - Mistake in presuming that this is possible with only very large bandwidths
    - possible to broadcast video lectures at 64 kbps
      - Questions possible on reverse channel
    - 64 kbps is universally available bandwidth
      - Stanford Outreach program registration up by a factor of five
        - when they opted to move from 56 kbps
  - Internet based education will truly take off at 64 kbps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Making a Business Case
One-Day Workshop held along with
National Conference on Communications 2003
organised by JTG of IITs and IISc
NCC
TeNeT Group
IIT Madras
B: Moderator [92.18 Kbps / 7.47 fps]
B: CSD [88.09 Kbps / 9.79 fps]
Moderated_server @ 10.7.128.3:7072
iSee View Address Book Options Help
Chat
Address Book
Online Users
Participants
CSD
Moderator
MPLab
Moderator: Good Morning Students
CSD: I have a doubt teacher
Type the message to be sent here and hit <Enter>
Send

Scaling Engineering Education

- Live web-cast for select lectures
  - Combined with web based material
  - Not a replacement of live classes
    - enabling interaction between teachers and students
- Bringing a good teacher in front of student every day
- Appropriately Designed Finishing School
  - using combination of live lectures and web-cast

Computers in School

Education in Schools: Can we reach all children?

- ICT can be a effective education tool
  - Only when children can play with it
    - with 5 computers for 500 students, one can get no where
- Can adequate computers in schools be affordable in country like India?
  - About 160 million school going children (Class 4 to 12)
  - Assuming 5 hours for each pair of students, one needs at least one computer for every 20 students
  - At most can spend $1 (Rs 50) per student per month towards CAPEX, OPEX, content

Monthly expenses per computer

- Internet: $ 2 (Rs 100)
- Operation & Mtc: $ 2 (Rs 100)
- Power : $ 3 (Rs 150)
- Content : $ 1 (Rs 50)
- Computer + SW + Server : $ 12 (Rs 600)

- Total $ 20 per month per seat ($ 1 per student)

- Today’s Computers and SW too expensive
  - Thin Client and Server may be the answer

Curriculum: Learning Computer Skills

- Can not be creative tool if it is some science thing
  - Computer training only for higher than average student
  - Introduce Computers through an art class
    - Drawing, cutting & pasting
      - Making greeting cards, sending messages
  - Then in Music classes
    - playing music and video, cutting, editing
  - Followed by
    - Geography class : GIS tools
    - Maths class: Spreadsheet
    - Presentation and Word processing
    - Tools for web-design, animation, content creation
  - Make Computer Learning fun

Computer based Learning

- Introduce curriculum training through computers
  - Teach subjects like Maths, Physics, Chemistry, Biology, economics, history, sociology, languages etc.
  - Require K to 12 content
  - Specific to India
  - Specific to each state in local languages
- In addition to professional material
  - Use teachers, parents and students for continuously expanding content

Educating Rural Children

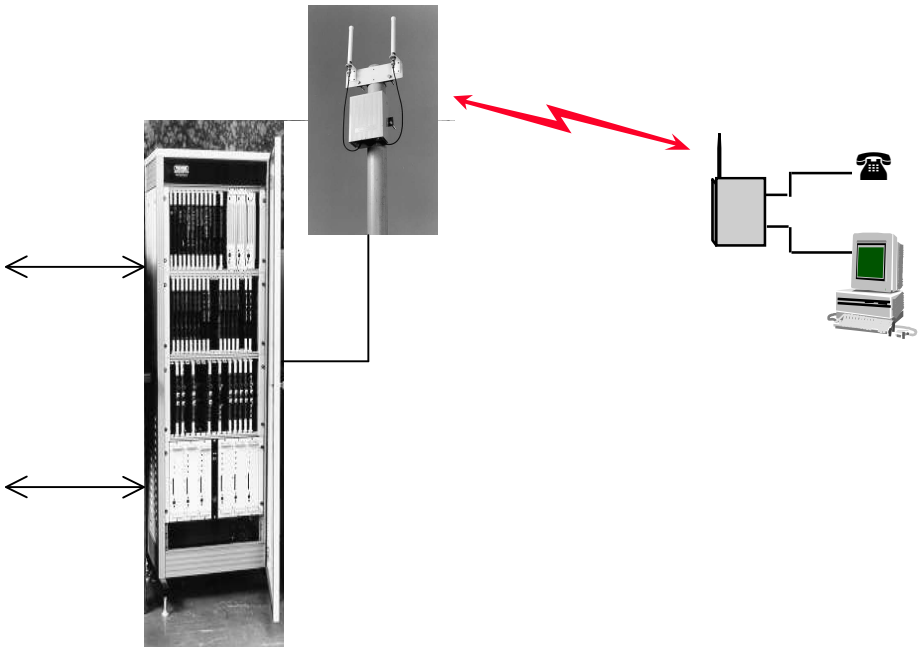
A Challenge

- Rural India has 700 million people
  - Living in 600,000 villages
  - About 200 million school going children
- Very little connectivity
  - Can computers and connectivity help in children’s education?

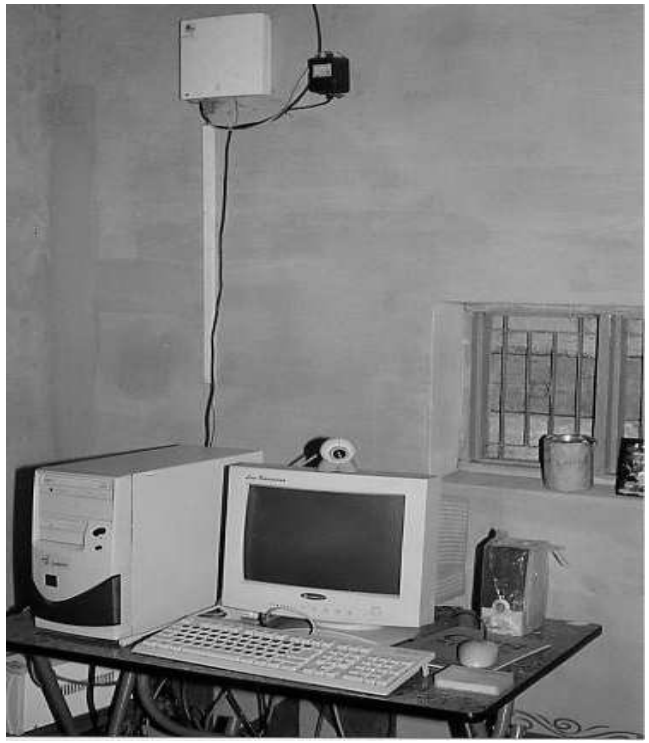
Innovative Technology for Rural India

- India has Fibre reaching most talukas
- 15 km coverage by wireless can cover 85% villages

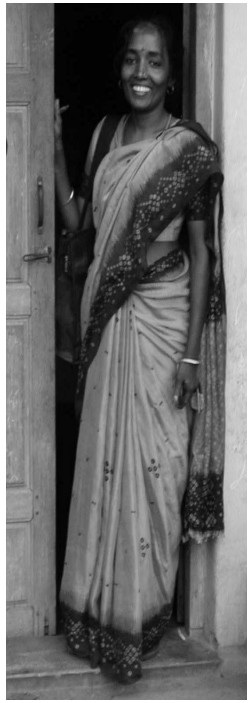
- Braoband CorDECT WiLL developed at IITM, India
  - provides a telephone line and 100/200 dedicated Internet connection in 30 Km radius
    - Exchange and tower in town
      - Works at 55° C
      - Power requirement: 1 KW
      - start-up costs very low



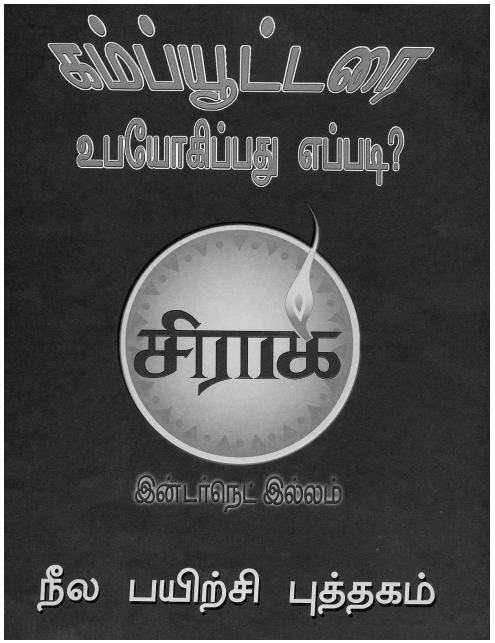
Innovative Business Models

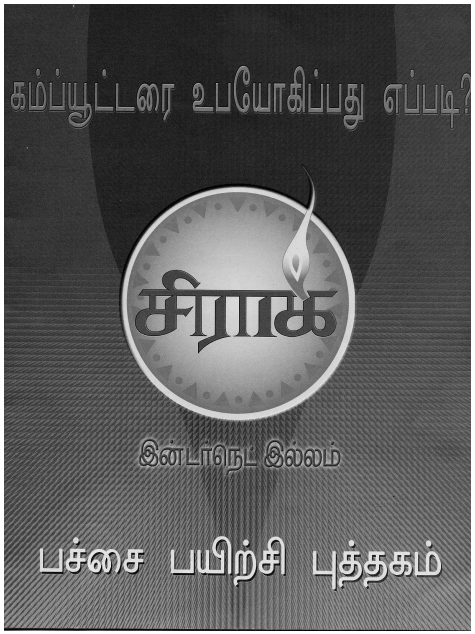


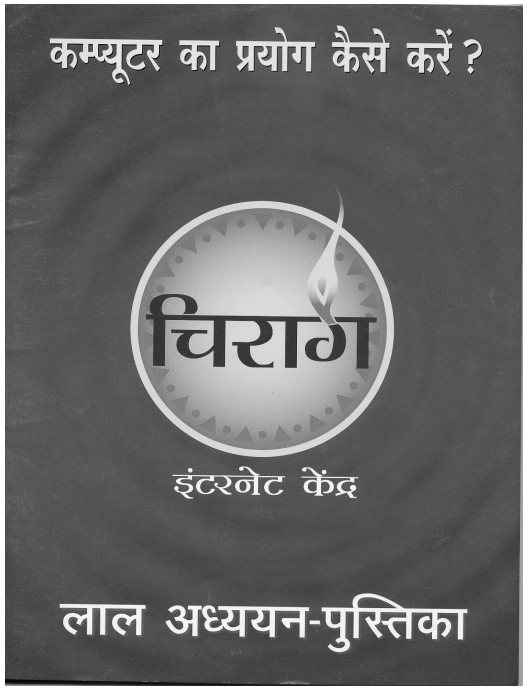
- n-Logue : A Rural Service Provider
  - aggregate demand into a kiosk
  - owned & driven by a local entrepreneur
  - $ 1000 (Rs 50000) per Kiosk providing telephone, Internet, multimedia PC with web-camera, printer and power back-up for PC
    - plus Indian language software, video conferencing software, training and maintenance and 6 months unlimited Internet
  - set up by a village entrepreneur on the lines of urban PCOs
    - provides telephone, stand-alone Computer and Internet services
    - needs Rs 3500 ($ 70) per month to break even



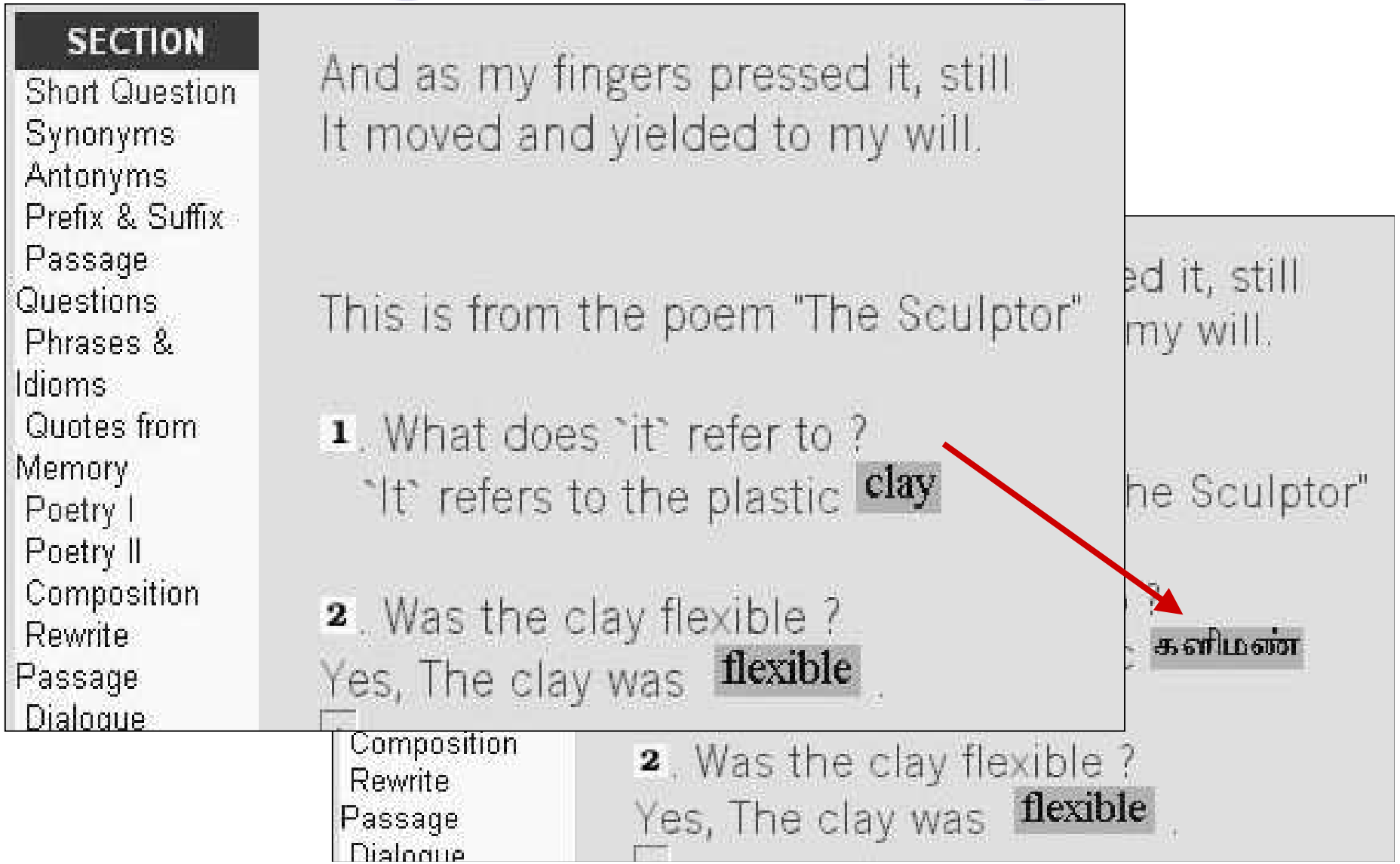
Customised ICT Courses for Various Age Groups – in Local Language

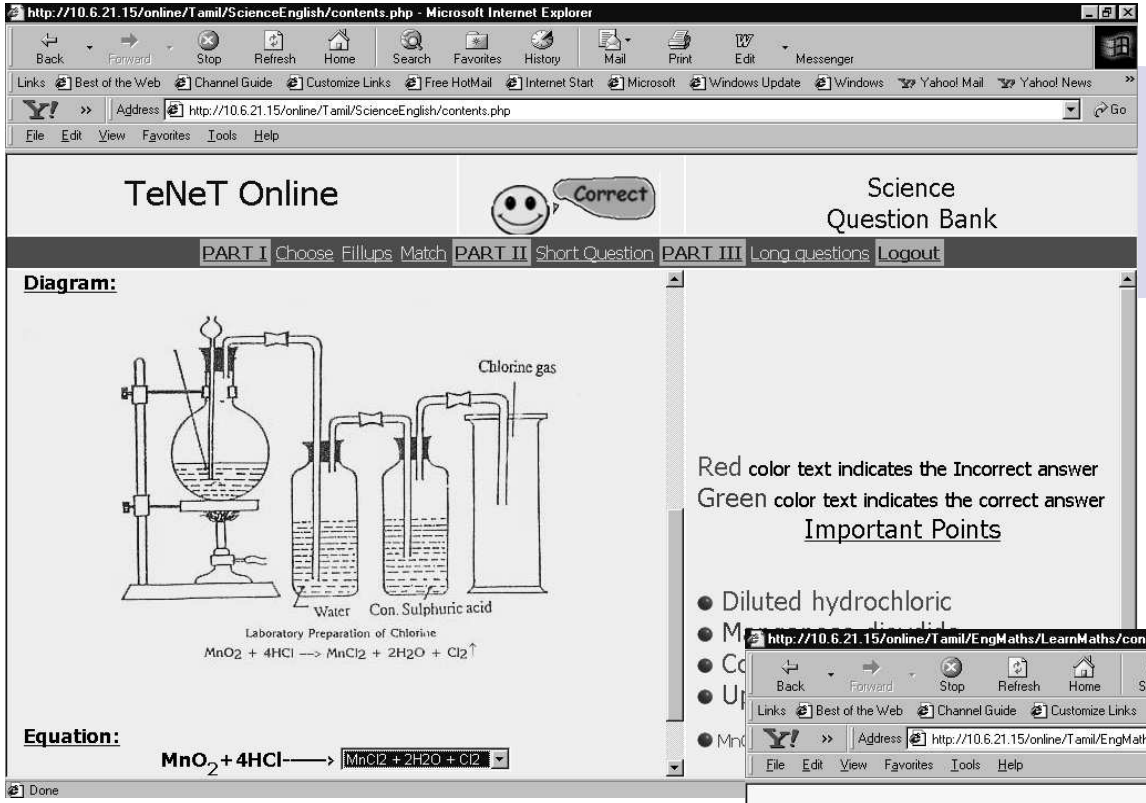




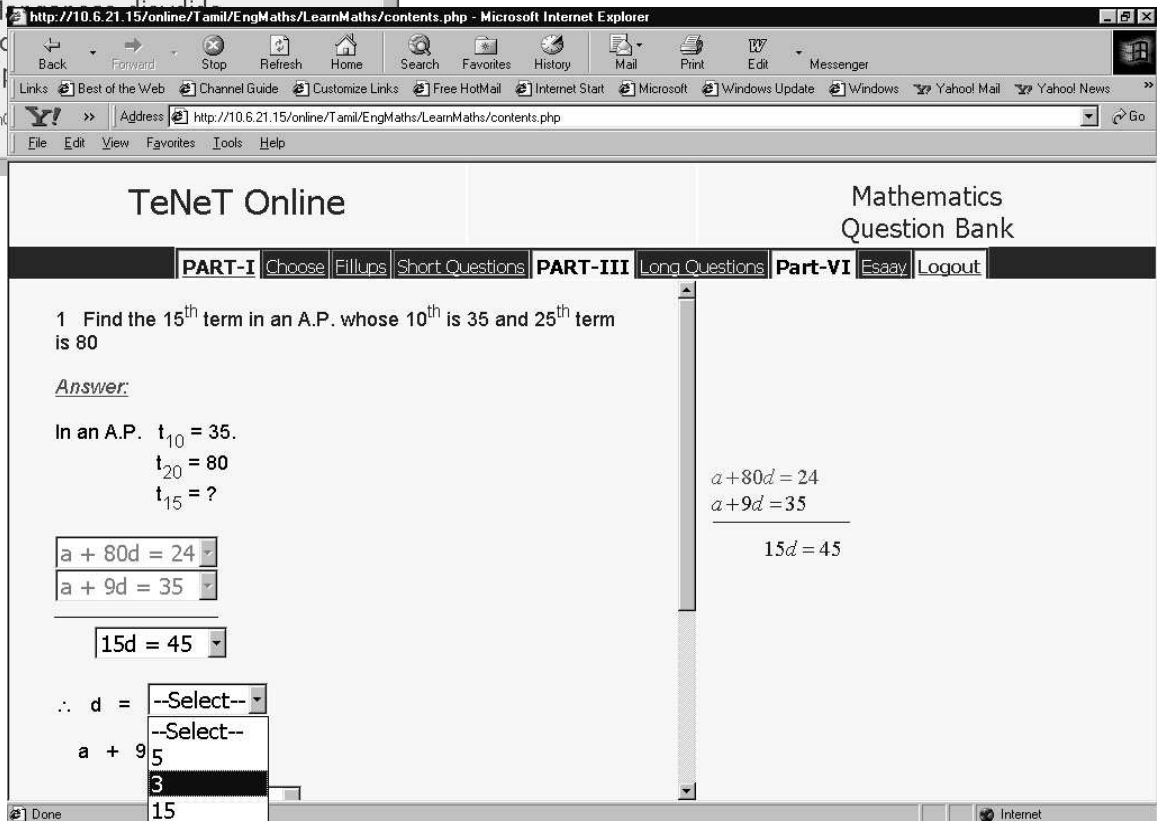


Remote Teaching: Tutorials

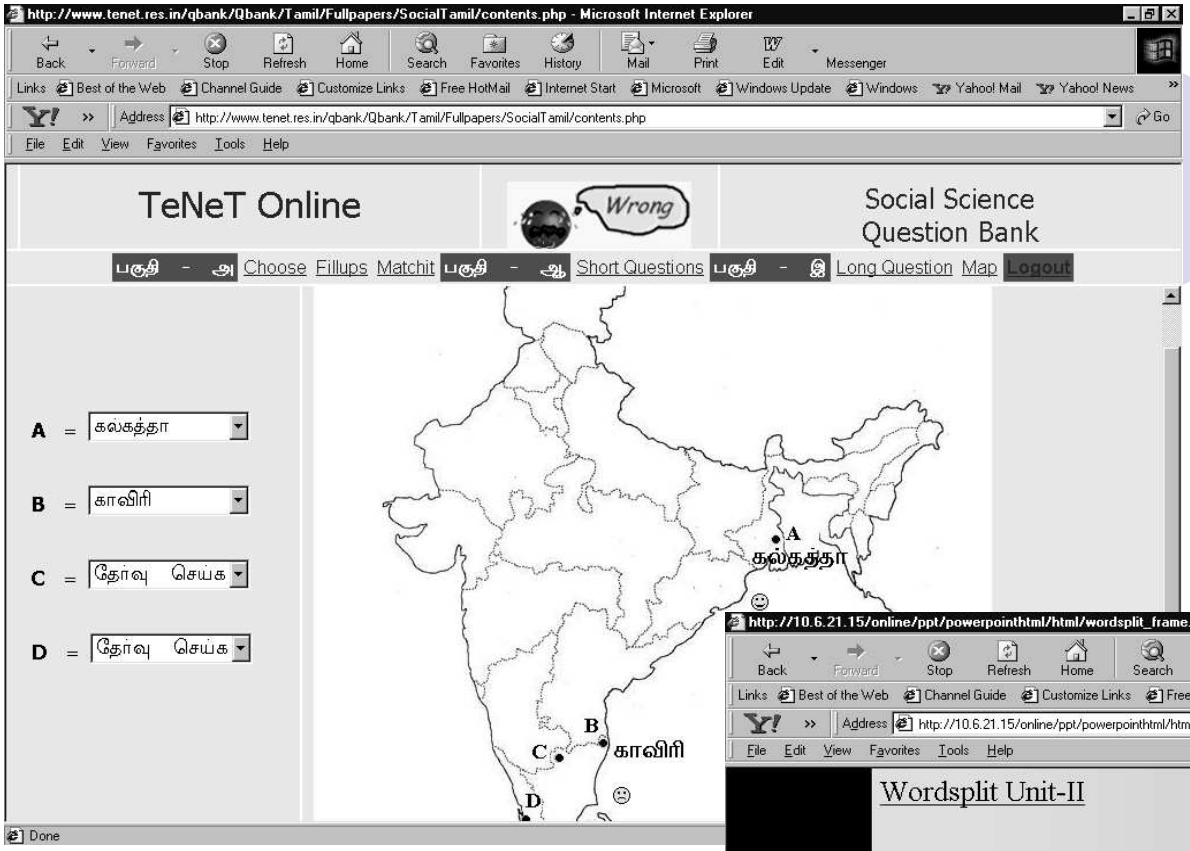




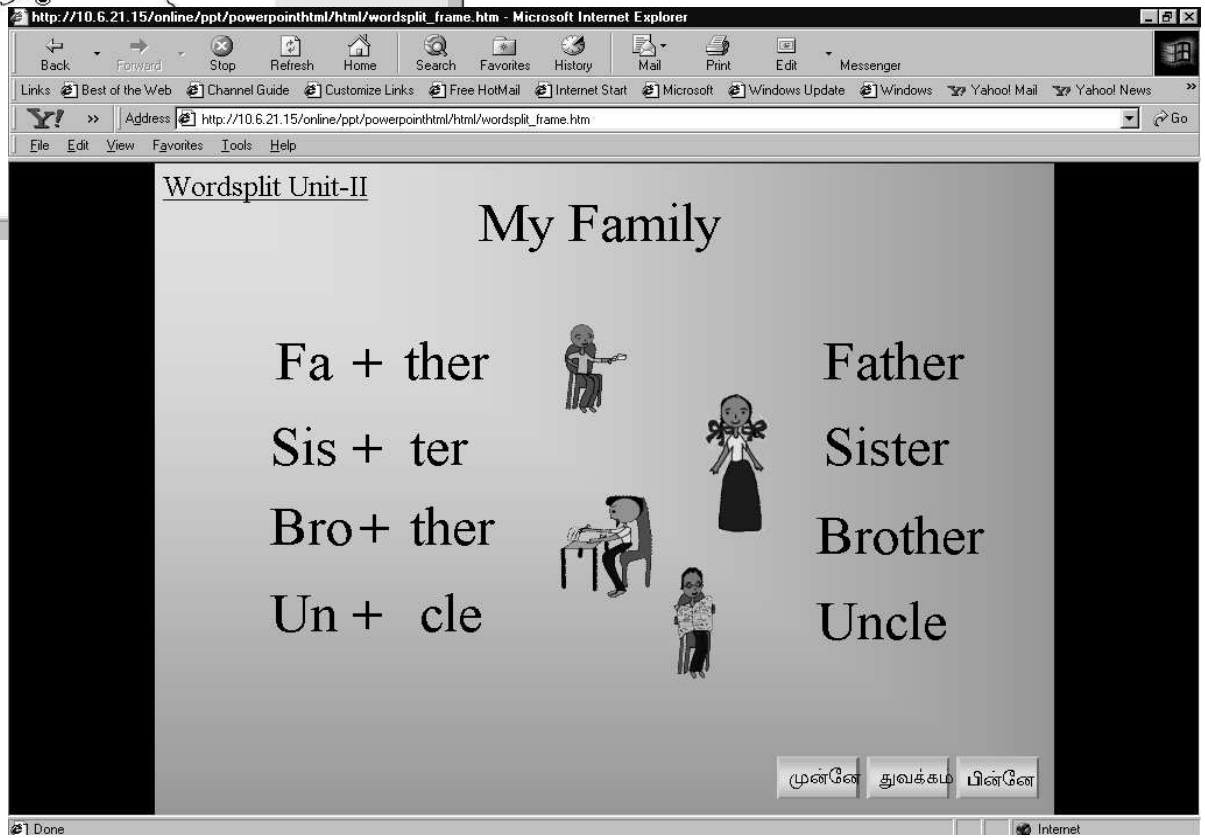
Science – Long Question B



Math – Long Question



Social – Map Question



Spoken English – Word Split

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Select Slide Show:

earth

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- Solar System.
- Force of Gravitation.
- Formation of Earth.
- Formation of Moon.
- Effect of Cooling.
- **How oceans and rivers were formed.**

B: Moderator [22....

B: Anitha [23.19 ...

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iSee View Address Book Options Help

Chat | Address Book | Online Users

Participants

Anitha

Moderator

Moderator: Good Morning Students
Moderator: Today we are going to see about long questions
Anitha: Ma'm I have a question

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Start | anitha@144.1... | OOPS iSee 0.... | untitled - Paint | B: Anitha [23.... | B: Moderat... | 10:16 AM

Technologies in Education

- Technology is a tool, not an end game
  - Can help bring in the scale
    - must become affordable
  - Can help enhance quality
  - Can introduce more creativity
- Challenge is to make it happen