Recap: The University **disconnect**
Reality/context for Universities

- Should road to Kurlod go via MIT or ... ?
Trajectory of the University

Western countries had local context

Steel consumption

19th century

Nano technology
Computing
Cloning

Electrical engineering

Medical science

Civil, structural and mechanical engineering

Agriculture

Pre-modern science

Liberal arts

Our context has to be our society!
Recap: The New Institution

• The University
  • Largest civil society organization
  • Third-party *peoples* consultant
  • Knowledge development for *our* society
What about academic requirements?

thermodynamics
heat transfer
structural design
fabrication
air quality testing
experimentation
& analysis
technology design
& dissemination

people-centric

environment
health
opportunity costs
(important gender issue)
employment
TDSL
Technology & Development Supervised Learning
TDSL mandate

- Knowledge generation for direct intersection with society
  - Enable from within academic program

- Focus on development issues
  - water, energy, health, agriculture, environment, malnutrition, infrastructure, ...
  - all issues people
TDSL principles

• Pre-requisites
  • Bottom 80% of the society
  • Core issue and sectors
  • Delivery is prime

• Development problems require good/sound engineering methodology
  • In fact “real” problems are harder!
  • Use primary experience to understand intersection of engineering and society
  • Our reality is our problem and solution domain
**TDSL structure**

- **td390 study**
  - introduction to field work, stakeholders
  - identification and formulation of problem

- **td490 analysis**
  - knowledge generation for specific situation
  - analyse problem and solution space
  - stakeholder inputs, situation analysis

- **td491 design**
  - knowledge application and creative component
  - field testing of outputs
TDSL and IITB

- Passed by IITB Senate as a formal academic course
  - On par with any other credits-course

- Important part of Institute's presence in the development sector

- Stakeholder's day
  - MoRD, WSSD, GP
TDSL execution

1. Question, narrative and expected deliverables
   Background, stakeholders, scope of problem, context
   Secondary data, related literature, govt. schemes ...

2. Methodology
   Basic tools, protocols, surveys, interviews, softwares,
   design of gadgets/solutions ...

3. Schedule
   Timelines, meetings, field visits, budgets ...

4. Closure and delivery
   Report, presentation, reporting to stake holder
TDSL offering

- First offering: Autumn 2009

- Targeted towards under-graduate (B.Tech) students

- Students earn *course credits* for TDSL
  - Post-graduate offering in the pipeline

- Student participation encouraging
  - ~100 students per year
  - Repeat registrations

- Summer interns
TDSL expectations

- ~100 hours over the semester
  - ~9 hours per week (6 credits equivalent)
  - ~5 field visits + time at IIT

- Interest to learn about **real** problems and its connections with engineering/technology/design
TDSL topics

- All faculty members of institute invited to float topics
  - Often used to do initial field work for research
  - To understand problem components

- TDSL co-ordinator works with faculty members to align topics with TDSL goals

- All topics need field visit component

- Each topic/project has 2-3 students/group
Sample projects

- Drinking water security assessment
- Brick making practices and interventions
  - NREGA analysis
- Understanding public health systems
- Design of piped-water supply schemes
- Analysis of sewage mgmt. techniques
  - Techno-economic analysis of poultry farms
- Survey and analysis of bio-gas plants

- Documenting pottery making techniques
- Oral histories of peoples issues
- Chulla dissemination and cooking practices
- Water sources status mapping
- Low-cost pulse recorder
- Economic analysis of weekly markets
- Failure analysis of water schemes
- Village-level environmental planning

TEQIP-IITB Consultation Session, September 2014
Design of low-cost pulse analyzer

- Diagnosing cardiovascular diseases is expensive
- Need a low-cost early detection system

**Output**
- Design and implementation of a low-cost device to be used at PHCs
Piped network for 70 villages

- Severe water scarcity in the summer
- Is a regional piped water supply scheme feasible?

Process
- Demand assessment, source identification, hydraulic simulations

Output
- Demonstrated feasibility of regional scheme meeting govt. norms
Feasibility of solar pumps for irrigation

- Feasibility study of solar/grid/diesel pumps
- **Process**
  - Survey of 4-5 solar pump installations
- **Output**
  - Understanding of maintenance protocols, pump sizing, community management process, battery
TDSL summary

- Understand problems of society to improve society
  - Start with problem not with solution
  - Study, analyse and design based on local context
  - Stakeholder is prime
- Modular design
  - Can be incorporated in local/regional colleges
  - Local knowledge centers
- An important experiment in the pedagogy of engineering and society
  - TDSL not about charity!
- Enabling the development professional
TDSL summary

- Interdisciplinary by design
- Student-driven development outputs
  - Manuals, training modules, case studies, audits, data collection and representation ...
  - Improve regional knowledge archive
- Applied engineering solutions are publishable
  - Thermal performance evaluation of a four pan jaggery processing furnace for improvement in energy utilization Vishal R. Sardeshpande, D.J. Shendage, Indu R. Pillai 3rd International Conference on Sustainable Energy and Environmental Protection, 2010
The way ahead

• Can TDSL be instantiated in your college?
  • TEQIP offers leeway
  • IITB can help formulate structure, whet projects

• Develop regional knowledge centers
  • Documentation of all chullas in a taluka
  • Water security status of a taluka
  • Ground water level monitoring
  • GISE cell for data representation
  • Energy audits of public services

• TDSC (Technology and Development Solutions Cell)
thank you

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