

# Towards Enhancing Higher Technical Education

Based on Report of the AICTE Review Committee

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# Basic Thrust

- In 1947 we liberated Durga, in 1991 we set Lakshmi free
  - Now it is the **turn of Saraswati**
- India is poised to emerge as the Technical Education Superpower of the world
  - AICTE has to be an autonomous Constitutional Apex authority to promote and develop technical institutions
- AICTE should **downplay** its regulatory policing role and concentrate on mentoring and guiding the technical institutions
- Using **graded autonomy**, in the next 10 years, most institutions should become full autonomous

# Context: Rapid Expansion of Technical Education

- Positives: **need to be celebrated**
  - More **opportunities** for youngsters of all sections of society
    - Starting to **reach under-served and unserved area**
    - Huge **manpower** to industry and services: It is graduates of these Institutes who has driven economic growth in the nation over the last 25 years
  - Huge Public and Private Investment
- Negatives
  - **Quality** of Education often dismal
  - Quality of **teachers** often dismal
  - Huge Capitation fees, Poor Salaries to teachers, Poor Infrastructure, bending of laws
  - Political and bureaucratic pressures on regulatory bodies and colleges
  - AICTE under stress

# Approach of the Committee

## Will **fix Quality** of Tech Education over the next 5 to 10 years

- **Minimum** Regulation and Permissions, Minimum Interference
  - Guidelines rather than prescriptions
- Creating an **eco-system for high-quality autonomous** institutes all over the country
- Encourage Autonomy - based on **estimates of Overall Quality**
  - As quality improves, enable **Graded Autonomy**
  - If quality falls below certain level, warn and take action without impacting students
- **New AICTE**: Will provide all kinds of **mentoring, promotion and support** for public and private institutions (**without discrimination**) to do better
  - Better coordination with Professional councils and Ministries

# Rating to be the Fulcrum of Regulation: Continuous Estimation of Quality

- AICTE to exercise **regulatory power** primarily based on RATING
- All Institutions would need compulsory rating (**not ranking**) every year by one of the empanelled rating agencies and Display it
  - An AICTE autonomous Agency (Committee) will define the process and oversee the empanelling agencies specialised for the task
    - Example: **ICRA, CRISIL, CARE Agencies** have done a fine job in rating industry and its state of finance and financial instruments: have no blemish
- Rating should be based on **outcomes such as student performance, on-line and in-person surveys of faculty, students and employers and quality of faculty** rather than mere existence of infrastructure

# Robust Accreditation and Autonomy

- Accreditation shall be **mandatory and shall be carried out by NBA** and independent accrediting agencies empanelled by it
  - NAAC will confine itself to accreditation of non-technical institutions
- Technical institutions will get **graded autonomy based on ratings**
  - Starts with degrees of **Academic Autonomy**, and then to **financial autonomy** and finally to completely **autonomous degree-granting institutions**
  - For full autonomy, it needs to also be accredited with high scores
  - A minimum rating plus accreditation by NBA would be **required** for an institution to run **any graduate course** (Masters or PhD)
- Higher the rating more support an institution will qualify for from AICTE / MHRD / Central Government Agencies

# Greenfield Rating

- AICTE to insist on **Greenfield Third party rating** for all new institutions
  - Evaluation of Project Plan, Promoters, initial Board members, infrastructure plans, faculty plans and key faculty
  - Quality of Governance and trust
- Must have **minimum grade to start** an institution
  - Greenfield Rating will also give weightage to density of existing institutions in the state / region
    - Discourage new institutions where there is high-density of reasonably good institutions
- New institutions to start as **Deemed to be autonomous**

# Supporting TE - Private and Public institutions

- AICTE to support fund and private and public Institutions through
  - Major initiatives for **training teachers**
    - Using ICT, continuing education
    - Attracting **top students (top 20% of UG classes) to be faculty**
  - ICT for students – **Live classes and MOOCs and Course-pack**
    - Flipped classroom teaching
  - E-Labs: ensure that practical exercises are not all reduced to simulations
    - Use of emulator: emulating near real life experience would help
  - Training management personnel and leaders among faculty and staff
  - Templates for good governance - transparent management, using IT
- AICTE to provide **funds** to institutions
  - for infrastructure, industrial interaction and entrepreneurship
  - for post-graduate scholarships



# Charting of Territories

- The courts are not to blame for the confusion in the jurisdictional issues
  - Government should draft the **legal provisions clearly** and without ambiguity
- The Committee recommends the following rationalisations
  - **Affiliation to universities** should cease within a decade
  - AICTE should be the **sole regulator of technical** institutions
  - Subject-matter councils should oversee the **professional practice**
    - Their views on academic issues should be discussed in the relevant Board of Studies

# Key Goal - AICTE should enable

- **Total Autonomy** within the next decade for existing Institutions
  - For new institutes once Greenfield rating is in place: autonomous institutes if rating is above a certain level
- Institutes which do not rise up to the challenge, should **merge with better** institutes
  - Full autonomy will require accreditation as well as high rating
  - **Graded autonomy based on Rating** alone

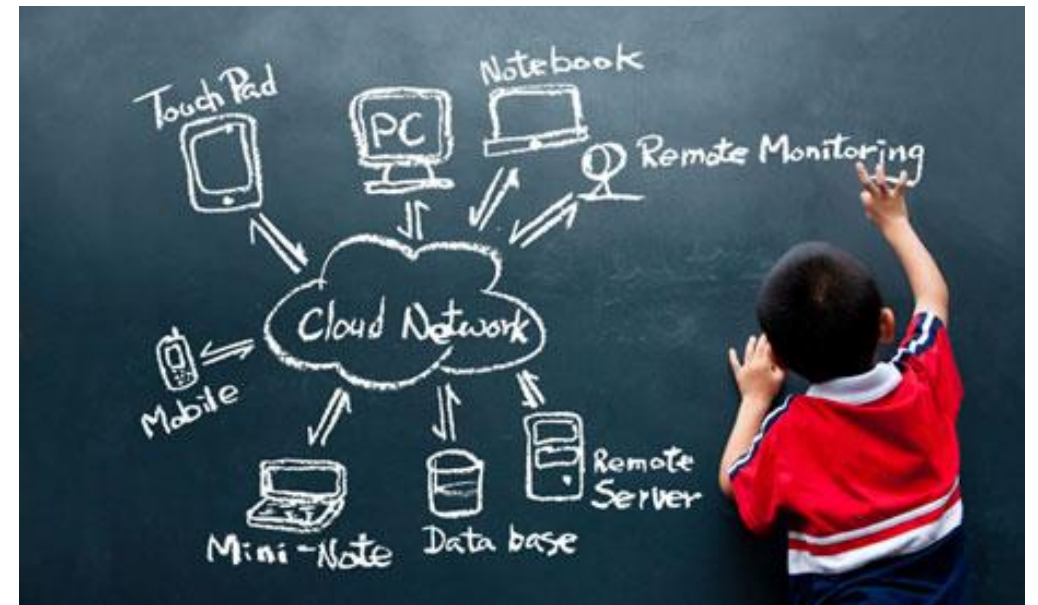
# Quantum jump in financial allocations

- Current measly allocation of around 200 crores for all self-financing institutions put together
- Recommendations: ₹5000 crores per year with a built-in annual escalation factor of 10%
  - Non-divertible and non-lapsable and the expenditure

# Attributes of Future Education – Some Thoughts

- Modularity
- Credit and Mobility System
- Non-linearity, Flexibility and Self-Paced
- Design Spine
- Experiential Learning
- Courage
- Churn

*Do not confine your children to your own learning, for they were born in another time (unknown)*



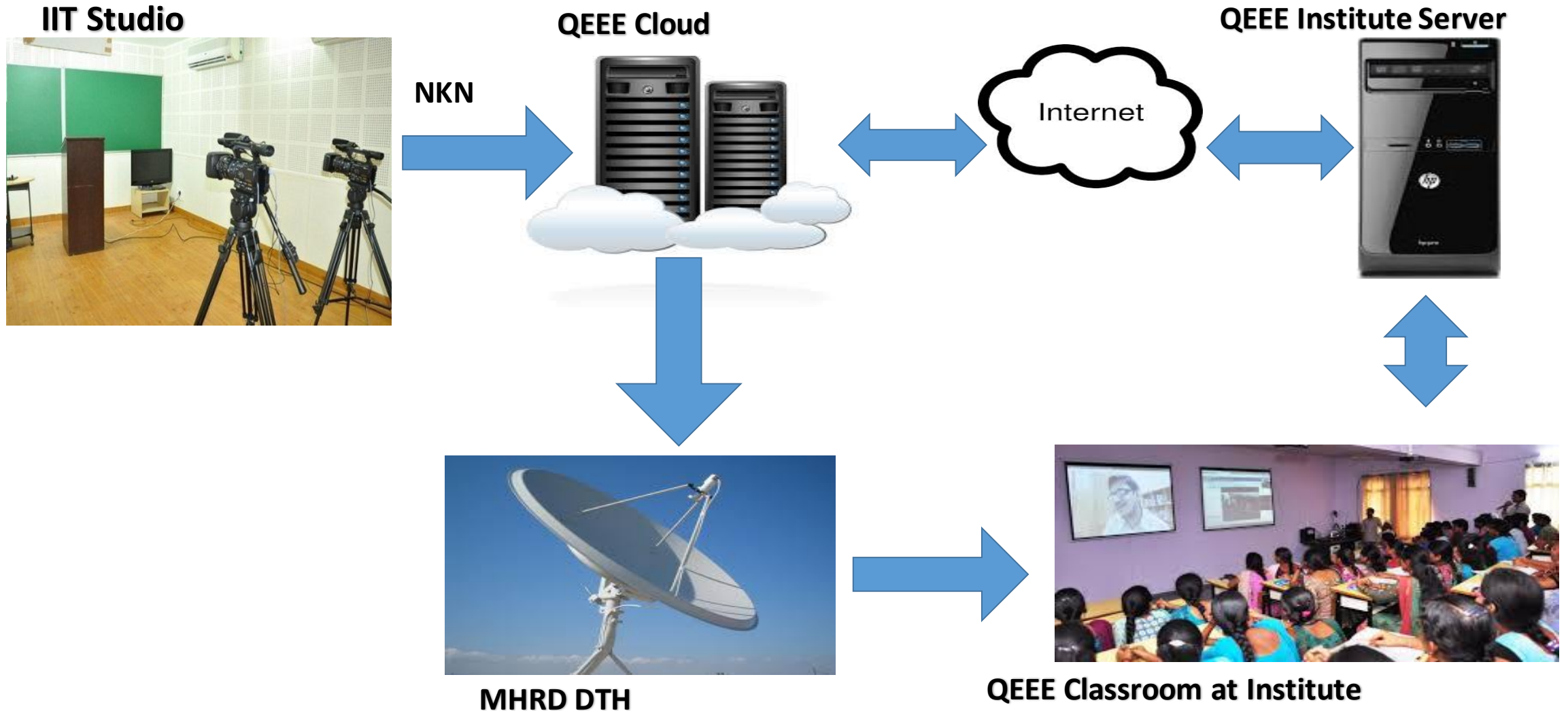
# How does one drive Quality?

Experimenting, **failing**, experimenting, failing and **experimenting again**  
till one meets success: Hard on oneself while measuring success

# India higher education Achievement dwarfed

- Quantity and Equity not an issue: 4000 Eng colleges; 1.5M students /year
- But quality flounders...
  - Quality teachers has not grown at the same rate
  - Infrastructure and teaching resources have also not kept pace
- ICT based MOOCs is being attempted to overcome this, but
  - MOOCs works well with the motivated students alone...
  - It bypasses the local teacher
- MHRD program on Quality Enhancement in Engineering Education (QEEE) recommended
  - “Live Class” using technology to facilitate interaction, by IIT faculty
  - “Live Classes” integrate the local teacher also into the teaching methodology

# QEEE Delivery Architecture



# Delivery through infrastructure specially designed and setup

## HARDWARE

## SOFTWARE

IITM

- ✓ Redundant heavy duty servers with adequate bandwidth on NKN

- ✓ Live class delivery in partnership with AVIEW, Amrita
- ✓ Monitoring and Management

LOCAL COLLEGE

- ✓ Server with required bandwidth to connect to IITM server,
- ✓ classroom with 2 projectors, screens, AV/ recording devices
- ✓ Dedicated computer / headphones per student for labs / tutorials
- ✓ DTH connectivity

- ✓ Web based interface for delivery developed at IITM
- ✓ “Course pack” with multimedia content and analytics



# QEEE SEM 1 : Jan – Apr 2014

- Infrastructure set-up
- 73 colleges participated
  - 12 “Live Classes”, 1 Tutorial, 2 Labs and 2 MOOCs offered
    - IIT Faculty delivered **15 lectures** ( roughly 1/3<sup>rd</sup> of the course) “live” to about 70 classrooms across the country
    - Tutorials offered by tutors, selected at IIT ( senior students) who worked on problem solving with a batch of limited students remotely
  - Virtual labs, assisted by remote tutors
  - Recorded videos made available to all colleges

# Mixed Feedback and Improvements...

- Quantitative feedback from about 56 local teachers and about 4500 students
- Informal feedback from co-ordinators and local teachers



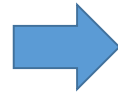
- **Mixed results**
  - Above expectations : 63% of local teachers and 40% of students
  - Below expectations : 21% of teachers and 35% of students
- Chief reasons - Time table / syllabus mismatch, technology issues – resulting in poor student engagement
  - Labs did not work well



- Program **Recast** based on suggestions from local coordinators / teachers
- More empowerment to local teachers
  - involved in program planning
  - Trained to provide tutorials
- Comprehensive testing at colleges for software/ hardware standards
- Labs dropped

# QEEE Sem2: Fall 2014 - Redesigned program

- 15 live classes, 10 tutorials
- CII Bridge introduced
- Spoken English introduced



- Feedback **still very mixed**
- Time table mismatch: each class wastes two hours
- Syllabus mismatch, technology continue to be issues; class timing problem
- CII Bridge and Spoken English well appreciated



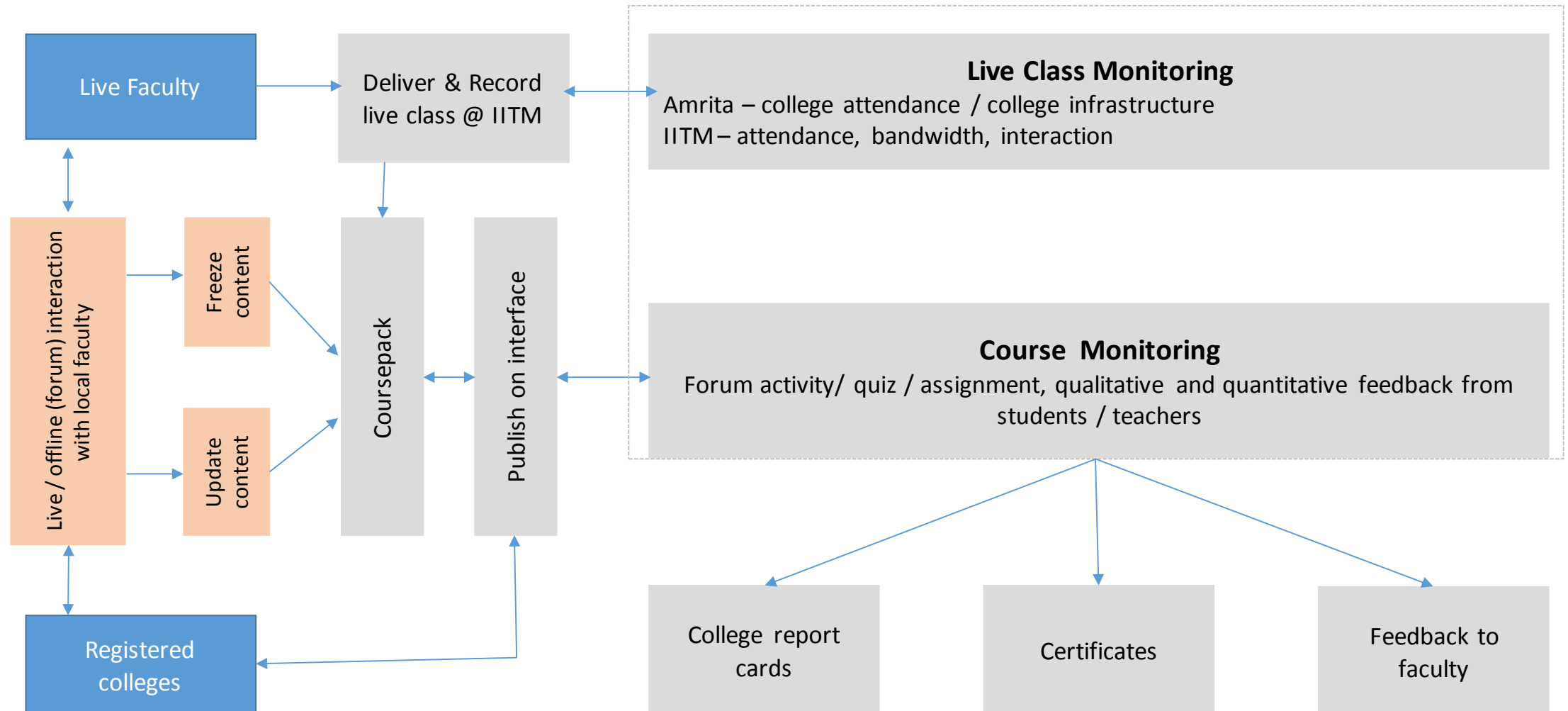
## PROGRAM OVERHAULED

- Program should be dropped: **Response was an overwhelming NO**
- Course only **offered in Modules**: 3 x 2 hours; 10AM to 12 or 2 PM to 4 PM (only 3 sessions)
  - each module has 5hrs live lectures plus 1hr tutorial discussion
  - Course Pack encapsulates all teaching material and recorded video (MOOC-like) – available to each student
  - In-class quiz, forums etc. to improve engagement
  - Monitoring of compliance, participation and performance
- Regular feedback to colleges, certificates for local faculty and students

# QEEE SEM 3 : Jan – Apr 2015

- 23 modules in **3 sessions of 2 hrs each** including one hour tutorial
  - Local faculty involved in deciding module as well as content
  - Local faculty to complete tutorials
- Bridge Program
  - Learning Programming in **vernacular languages**
  - Spoken English
- Detailed analytics on live class participation as well as course pack usage
- College report cards for each college for each course
- About 100 colleges participated

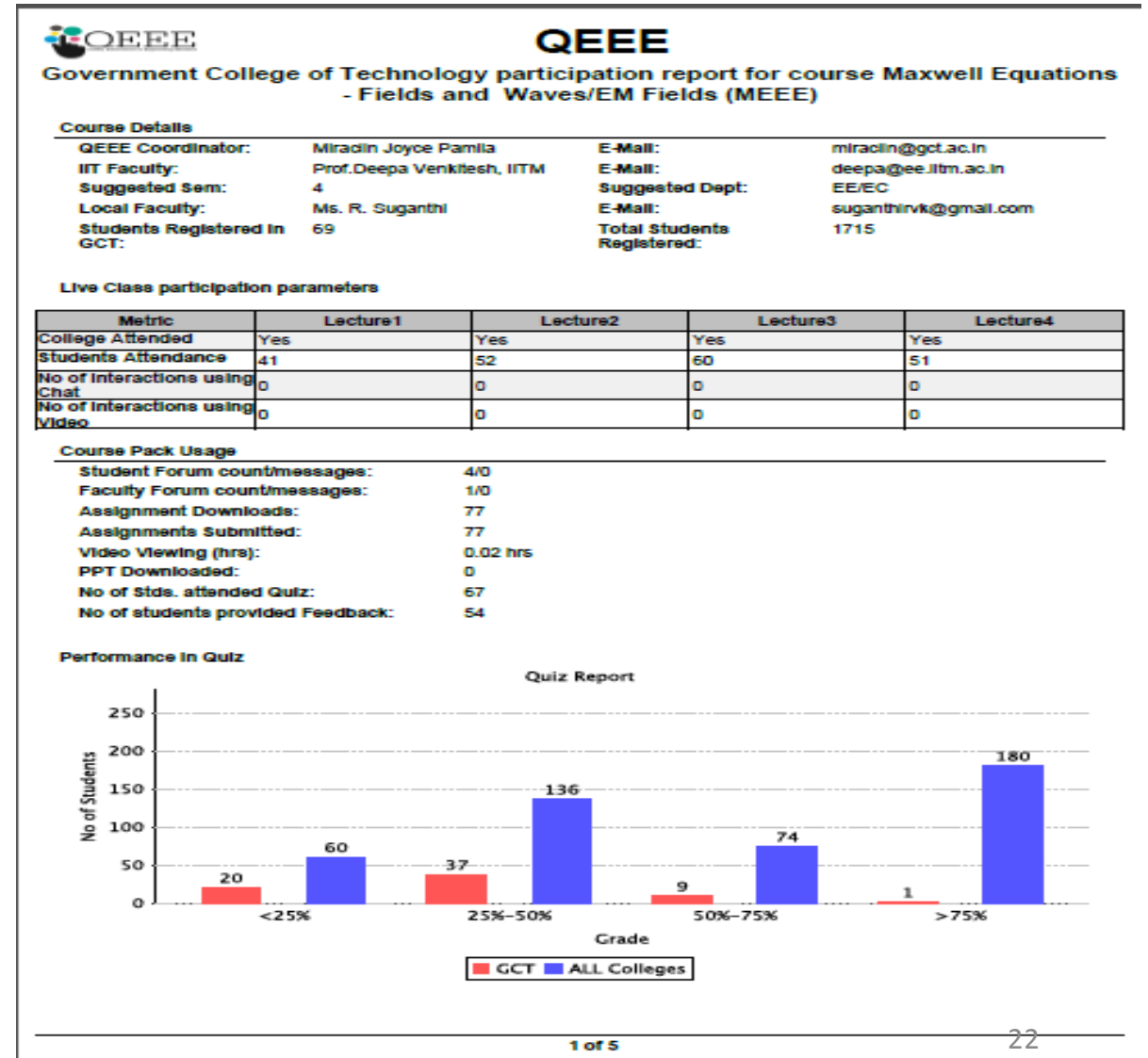
# Course Lifecycle : a complete learning experience



# Sample College Report

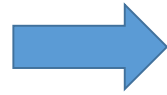
College heads provided comprehensive reports at the end of each module

- Attendance / Participation data – A/V and chat interaction data
- Content usage data - coursepack viewing, assignment, quiz marks
- Their college performance in live quiz vis-à-vis other colleges
- Their college feedback vis-à-vis other colleges



# Feedback surprisingly positive...

- Extensive feedback sought
  - Quantitative feedback from 8000 students and 650 teachers
  - Colleges invited to feedback workshop for qualitative feedback



- Above expectations – 79% of teachers and 70% of students
- Below expectations – 8% of teachers and 10% of students
- **Quality of faculty well appreciated**
- **Coursepack and detailed reports useful to colleges**
- Bridge programs popular

But, there are still some issues...

- Technology is still a problem
  - College end – need to follow up and ensure adherence to standards
  - Delivery end – Bandwidth, Aview software issues due to scaling
- DTH quality is not very good: require digital DTH

# Feedback incorporated into QEEE IV– FALL 2015

- Program
  - **Module-centric approach** similar to SEM 3
  - Some Experiments with Labs
  - Industry interaction sessions with CII to be reinstated
- Technology
  - Problems with communications / software is being resolved
- Others
  - Certificates for Students, Co-ordinators, Local Faculty and Administrators to be planned
  - **Monitoring and reporting** similar to SEM 3 will continue
  - Students and faculty will be encouraged to use **forum for off-line interaction** with live faculty
  - Strong Evaluation Criteria



# QEEE IV : Fall 2015 (Aug – Oct)

- Continue with “topic-centric” modules with Coursepacks
  - More than one 6 hrs module can be offered for a course
  - 30 technical topics by faculty from IITM, IITB, IIT Kgp, IITD, IIT Hyd, IIT Mandi with parallel session included and schedules finalized
- Lab: Digital Signal Processing
- Bridge Program
  - Learning Python in vernacular Languages: Tamil, Hindi, Telugu, Kannada
  - CII – Industry bridge
  - Spoken English



**QEEE**  
Quality Enhancement in Engineering Education

**With one click!**  
Get access to lectures and content from the top IIT professors  
Expand the definition of a classroom  
Learn with a wider student community from 200 colleges pan India



MHRD brings to you a new and interactive educational experience through **distinct learning modules**.

**Live classes:** 30 topics across different Engineering Departments brought to your classrooms live on video by Professors from IIT Madras, IIT Bombay, IIT Delhi, IIT Kharagpur, IIT Hyderabad and IIT Mandi.

**Labs:** Remote labs to broaden learning horizons.

**Bridge Programs:** Off-curriculum courses focusing on imparting soft-skills and making students employable. Also look out for interactive sessions with Industry experts from Aerospace, IT, Electronics, Telecom, Auto, Chemical, Utilities, Consumer durables and more sectors to learn about emerging technology trends in their domain.

Classes start on Aug 3rd 2015



Government of India  
Ministry of Human Resource Development

# Going forward...

- Over the next semester introduce new topics, more labs, more non-curricular programs and fine tune for maximal impact
  - Digital DTH
  - Create a set of Course-pack / MOOCS
  - Be more creative with feedback mechanism
  - Assess longer-term impact on students / local faculty
  - Stitch in the course performance for grades awarded by colleges
- Professionalise Organisational aspects: a company / agency
  - Take over program delivery from IITs
  - Keep the curricular aspects at IITs

# To Sum Up

- Pursuit of Quality is all-round hard effort
  - Quick-solution will not work
- Require strong sense to figure out what works and what does not
- Can not give up