GC 2012-5628: INTERNATIONAL COLLABORATION IN CURRICULUM AND LABORATORY DEVELOPMENT

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INTERNATIONAL FORUM : INTERNATIONAL COLLABORATION AND CURRICULUM AND LABORATORY INNOVATIONS

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2. Some Existing Academic Dialogues Between India and China
3. International Collaborations with Asian Countries
4. Some Successful Indian Bilateral Cooperation Initiatives – IIT Madras
5. IIT Bombay -- Role of the Office of the Dean for International Relations

6. **The Nature and Scope of Collaboration**
7. **“Global Partnerships: Drivers and Relationships” (Points from Prof C D Mote Jr ’s Presentation)**
8. **Curriculum , Pedagogy and Laboratory Innovations**

THE EVOLUTION OF INTERNATIONAL ACADEMIC COLLABORATION IN INDIA

- **It is now one of the most significant ingredients of the strategic plan of a University and of the University President's Agenda .**
- **The earlier perceptions or paradigms of international academic collaboration were in terms of aid, assistance, direct support, grant, donation of equipment, and secondment of faculty and technicians.**
- **It was normally valid for a specified duration, sometimes extended for a further period**

➢**Most universities have full-fledged Offices of International Relations, headed by a Dean.**

➢**With the simultaneous prevalence of excess demand in (population-rich) developing countries, and excess capacity in developed countries, several developed countries are holding 'Education Fairs' in developing countries to attract their (fee-paying) students; for example , Australia, Canada, Germany, France and USA.**

- **Partner Institutions are seeking strong and 'meaningful relationships', adding value, not just signing MoUs.**
- **Opportunities now exist for international partners to access third-party funding agencies, such as EU, WB, ADB .**
- **Exchange of undergraduate students has become very common and popular, for summer internship, earning credits, or pursuing project work ; it is often supported by well-placed alumni.**
- **Donee countries also have begun to share the funding requirements.**

R&D OPPORTUNITIES

- **By exploiting the time differences between appropriate time zones (such as, for example, India and the US), 24/7 R and D can be pursued.**

- **Remote experimentation permits remote access of sophisticated and expensive equipment and enables more intense international collaboration between researchers.**

EARLY MODELS

- **The earlier models involved a Donor institution (or country) and a Donee institution (or country).**
- **It was normally the result of a bilateral agreement between governments or institutions, through an MoU , for example.**
- **International Fellowship programs enabled researchers world-wide to travel to and pursue research in developed countries; such as for example, Humboldt Fellowships (Germany) ; Fulbright Fellowships (USA) ; and Commonwealth Fellowships (Commonwealth Countries).**

RECENT AND EMERGING MODELS

I Consortium mode collaboration :

Two groups of institutions from two countries entering into an umbrella agreement , enabling a more effective and significant impact ; such as for example :

- **G-8 Canadian research universities with 5 IITs (for comprehensive collaboration) ;**
- **6 German universities with 5 IITs (for exchange of postgraduate scholars);**

- **5 ATN Australian Universities with 5 IITs (for comprehensive collaboration) ;**
- **Australian research universities with 5 IITs and I.I.Sc. (for research collaboration);**
- **EPFL and ETH, the two Swiss Federal Institutes of Technology , with the IITs and IISc.(for comprehensive collaboration).**

SOME EXISTING ACADEMIC DIALOGUES BETWEEN INDIA AND CHINA

- India-China Eminent Persons Group
- Indian National Academy of Engineering and Chinese Academy of Engineering (CAETS)
- Mutual Visits of Academics and Professionals
- Bilateral Cooperation between Institutions

CONTENT OF A DRAFT MoU BETWEEN INAE AND CAE IN ENGINEERING AND TECHNICAL SCIENCES -- 2008

- **FORMS OF COOPERATION:**
  - **Study Visits**
  - **Exploratory Missions – to facilitate collaboration in Engineering, Science and Technology**
  - **Joint Seminars / Workshops**
  - **Exchange Information**
  - **Other Activities of Mutual Interest for Mutual benefit**

MINUTES OF THE INDO-CHINA DIALOGUE
Lakeview Hotel, Beijing, October 20, 2011

❖ **Similarities in the Indian and Chinese Systems:**

- **Huge size, both in terms of number of institutions and admission capacity.**
- **Only a small proportion of the engineering programs have been accredited.**
- **Engineering students have limited industrial exposure and experience.**
- **Uneven geographic distribution of engineering institutions in the country.**

- **The assessment and promotion criteria for Teachers are biased toward R&D and industry contributions, and less importance to Teaching and Student Learning.**
- **Brain Drain, especially to the US.**
- **Indian and Chinese entrepreneurs have achieved phenomenal success in Silicon Valley start-ups. In fact, Anne Lee Saxenian of UC Berkeley has interpreted ICs (Integrated Circuits) as Indians and Chinese!**

❖**Major Differences**

- **Self-financing institutions comprise about 75% of engineering institutions in India, whereas in China all engineering institutions are government institutions.**

- **India has a predominantly affiliated system, unlike China**

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MAJOR RECOMMENDATIONS

- **Collaboration between Indian Society for Technical Education and Chinese Association for Engineering Education**
- **Collaboration through international Organizations, such as ASEE, IFEES, GEDC, etc.**
- **Collaboration between individual institutions**
- **Collaboration between individual Faculty members**
- **Joint Activities - Exchange of Students, Faculty, Academic Leaders; Conferences, Workshops**

SOME POINTS FOR DISCUSSION

- **Accreditation and Quality Assurance**
- **Scaling up of Undergraduate, Postgraduate and PhD capacity; and resultant Challenges**
- **Emerging Global Engineering Challenges and Opportunities – as, for example, represented by *NAE Grand Challenges* and *Millennium Development Goals***

SOME POINTS FOR DISCUSSION

- **Major Reforms in Higher Education in India and China**
- **Joint Activities – Exchange of Students, faculty, Academic Leaders; Conferences, Workshops**
- **Faculty and Leadership Development**

SOME SUGGESTIONS FOR COLLABORATIVE ACTIVITIES

- **Sharing of Best Practices in Quality and Accreditation**
- **Analysis of Implications of Globalization**
- **Possibilities of International Accreditation**
- **Training Programs for Accreditors**
- **Linkages with Curriculum and Delivery**
- **Joint Workshops**

INTERNATIONAL COLLABORATIONS WITH ASIAN COUNTRIES

- **India has a long history of international collaboration with several countries worldwide, also with other Asian countries, such as China, Japan, Korea and Malaysia.**
- **Some of the successful collaborations are for example, through the mechanisms of:**
  - **India-China Eminent Persons Group,**
  - **Japan Society for Promotion of Science,**
  - **Association of Commonwealth Universities Conferences**
  - **the Annual Asian University Presidents Conferences**

SOME SUCCESSFUL INDIAN BILATERAL COOPERATION INITIATIVES

- **Indo-German Collaboration**
  - **Setting up of IIT Madras (approx. 50 years ago)**
    - **Considered to be a Role Model for International Bilateral Technical Education Collaboration**
    - **Has evolved over the years into a valuable Partnership, characterized by mutual respect, reciprocal benefits, joint activities, …**

THE IIT-MADRAS SUCCESS STORY – SOME CRITICAL SUCCESS FACTORS.

- **Commitment of the persons responsible for leading the initiatives.**
- **The strength of the German Technical Education System.**
- **An understanding of the context in which Technical Education was to be imparted in India.**
- **Focus on the practical aspects, such as Workshops and Labs.**

THE IIT-MADRAS SUCCESS STORY – SOME CRITICAL SUCCESS FACTORS.

- **Proper choice of Plant and Machinery.**
- **Deputation of renowned Professors and Technical Personnel.**
- **Continuous monitoring.**
- **Young and motivated faculty and staff, who gave generously of their time, energy and effort**

SOME LESSONS FROM EXPERIENCE

- **Continuous Commitment from the Top**
- **Connections, Action at the bottom.**
  (People to People Contacts) provides the glue for the bond.
- **Alumni as a potent Catalyst.**
- **Need Time, Energy, Goodwill for Success.**

IIT BOMBAY -- ROLE OF THE OFFICE OF THE DEAN FOR INTERNATIONAL RELATIONS

- **To promote relationships between foreign universities and institutions and IIT Bombay (IITB), and to help define the scope of such relationships through appropriate MoUs.**
- **To promote exchange programs for students through Student Exchange Agreements with partner institutions.**
- **To interface with other internal entities to facilitate the visits of delegations and students coming to IITB.**

- **To co-ordinate with Dean, Academic Programs and Dean, Students Affairs in deciding policy matters affecting both outbound and inbound students participating in Exchange programs**
- **To interface with the Ministry of Human Resources Development, Ministry of External Affairs, and Ministry of Home Affairs, Government of India, and State Government Offices on all matters pertaining to internationalization efforts of IITB.**
- **To interface with embassies and consulates of various countries to increase educational and cultural linkages between organizations in the foreign countries and the Institute.**

❖ **To arrange and administer foreign language courses for students and staff of IITB.**

❖**To facilitate and promote the internationalization of IIT Bombay by setting up academic ventures in collaboration with global institutions and facilitate newer models of collaborations**

❖**To partner with other Universities in India to enhance collaborative research**

1 THE NATURE AND SCOPE OF COLLABORATION

❖**The rationale for Collaboration is highlighted by Henry Ford's statement :**

"Coming together is a Beginning ;
Keeping together is Progress ;
Working together is Success"

2. WHAT IS COLLABORATION ?

- **Rebecca Ament : 5 criteria for a relationship to be characterized as Collaboration :**
  - **programs or projects are jointly designed and monitored**
  - **Some autonomy is sacrificed by participants**
  - **Resources are contributed**
  - **Organizations are mutually benefited**
  - **Administrators are actively involved, or are supportive of the relationship, and maintain final decision-making powers**

3. BENEFITS OF COLLABORATIVE RELATIONSHIPS .

- ❖ **Information, ideas and resources can be pooled.**
- ❖ **Duplication and harmful competition can be avoided.**
- ❖ **Partners can provide useful information, or needs assessments and program evaluation, suggestions for curriculum development, identification of participants, use of facilities.**
- ❖ **Collaborative relationships expand the capacity of the participants to accomplish objectives that can not be accomplished as well, alone.**

4. SOME BARRIERS / INHIBITORS FOR COLLABORATION

- **They come in the way of realizing the full potential that exists.**
- **They represent the impedances against the flux of benefits to the collaborating partners.**
  - **lack of appreciation and understanding of each other's roles, strengths, weaknesses**
  - **lack of communication**
  - **lack of committed individuals on either side**
  - **lack of commitment at the top**
  - **lack of recognition for collaborative work**
  - **lack of institutional and logistical support**
  - **lack of coordination and single-window access**

5. SOME ENABLING FEATURES FOR PROMOTION OF COLLABORATION AND REMOVAL OF BARRIERS

❖ **In order to derive the full benefits of Collaboration, it is necessary to identify and remove the barriers / inhibitors for Collaboration :**

- ❖ **identify committed individuals ("champions") on either side, and empower them.**
- ❖ **enable potential partners to communicate with each other**
- ❖ **accord recognition for collaborative work**
- ❖ **put in place institutional mechanisms for promoting collaboration**
- ❖ **identify collaborative partnership as a strategic intent**

GLOBAL PARTNERSHIPS: DRIVERS AND RELATIONSHIPS

C. D. MOTE, JR.

ASEE Global Symposium on Engineering Education
Shanghai Jiao Tong University , Oct 25, 2011

AGREEMENTS DEPEND ON CULTURE

- **Agreements in a culture have to be approached from *that culture's* point of view (not *yours*).**
  - **If you don't do so, prepare for an unsatisfactory experience.**

- **This often gets no attention until things just don't work out and relationships are damaged.**

PARTNERSHIPS ARE INTERPERSONAL FIRST

- **Interpersonal relationships are the first and foremost critical partnership issue .**
  - **Formal agreements come later**
  - **Partners must have position**
  - **Partners must be able to deliver to the partnership**

TRUST IS EVERYTHING

- **Trust is Everything**
  - **No trust => no partnership**
  - **Uncertain trust => no partnership**
  - **Partners take risks engaging with each other**
    - **Each has to sell the partnership to others**
    - **Each puts his/her face & credibility on the partnership**
    - **Each fails if the partnership fails**
    - **Failures can have lasting consequences**

CURRICULUM , PEDAGOGY AND LABORATORY INNOVATIONS

- **The recent initiatives in several countries in Asia to join the Washington Accord have stimulated interest in Outcomes-Based Teaching-Learning (OBTL), which involves the articulation of Program Objectives and Program Outcomes.**
- **In addition, Bloom's Taxonomy and Howard Gardner's Theory of Multiple Intelligences have been responsible for Curriculum and Pedagogy Innovations.**
- **There are also significant changes in the objectives and design of Laboratory Instruction and Practices – more of open-ended exercises**

WIPRO MISSION 10X AND ULTP

- **Wipro Mission10X aims to enhance the quality of engineering students with a focus on industry readiness and research expertise.**

- **Apart from training engineering pedagogy techniques to the faculty, ULTP is introduced under integrated learning framework to facilitate hands-on learning of advanced engineering technologies.**

ULTP – UNIFIED LEARNING TECHNOLOGY PLATFORM

- **ULTP is a practice- based learning framework developed to inculcate application-oriented learning in engineering colleges.**

- **It leverages latest technologies to bridge the gap between academia and industry.**

ULTP – TECHNICAL DETAILS

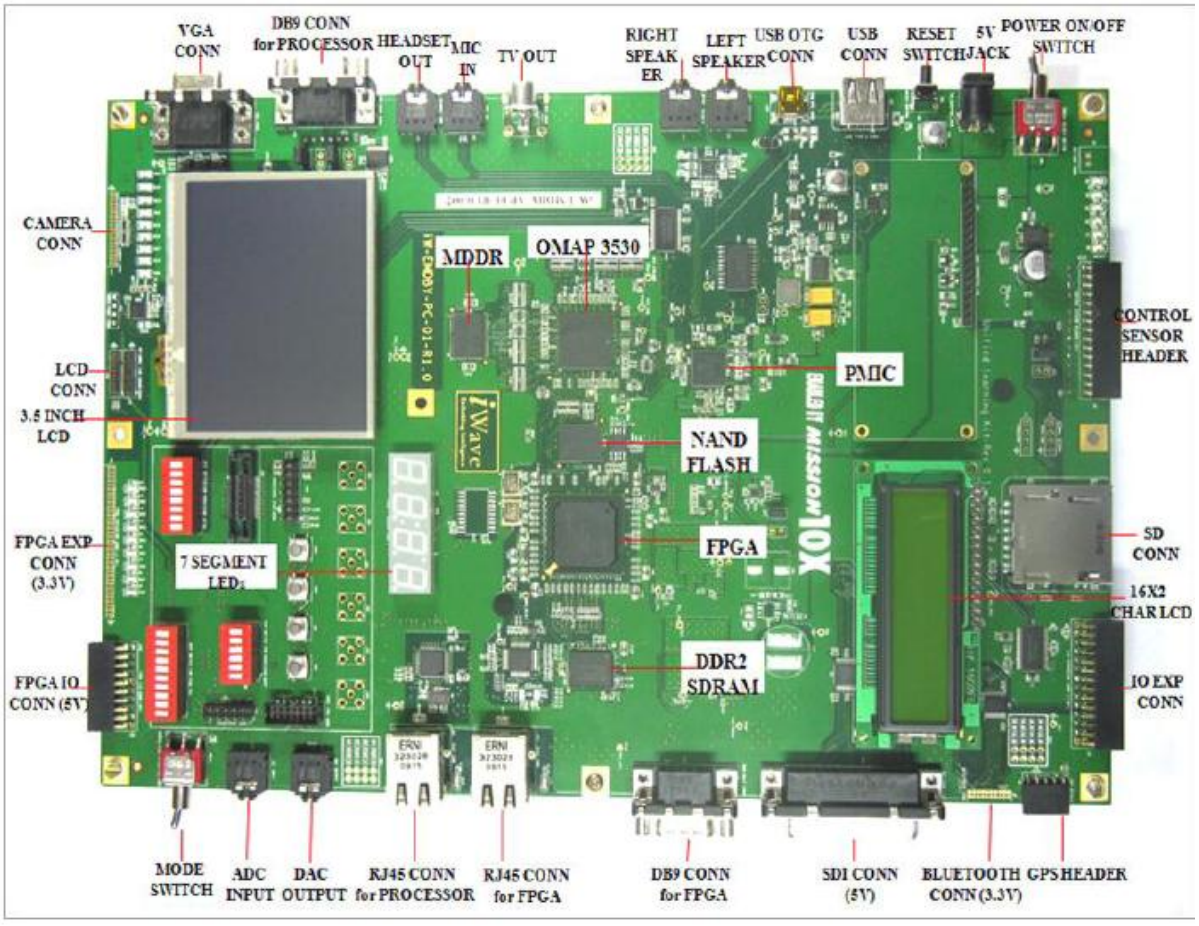
- **World's leading Multimedia OMAP platform**
- **Embedded processor from widely used and supported ARM**
- **DSP processor from TI**
- **Latest FPGA from Xilinx**
- **Standard Industry interfaces like JTAG, SD Card Interface, Ethernet, LCD Panel, UARTs, USB Host and USB Device**

ULTPK EXPOSES THE STUDENTS TO MULTIPLE APPLICATION DOMAINS:

- **Medical electronics**
- **Automotive electronics**
- **Consumer electronics**
- **Mobile applications**
- **Communication applications**
- **Bio-medical applications**
- **Industrial automation**
- **Multimedia and Gaming**

PEDAGOGICAL ADVANTAGES OF ULTP

- **Applicable for courses on digital systems from 3rd semester to 8th Semester**
- **Enables holistic learning, reinforces the theoretical concepts taught in the classrooms.**
- **All-in-one solution for realizing laboratory exercises for more than 10 subjects in the circuit branches**
- **Raises the skill level of the students by exposing the students with industry-oriented, cutting-edge technology and makes them industry-ready.**
- **Supports advanced real-life application development for the students as part of their final year project.**
- **Helps the student develop system and solution building skills by providing holistic approach to domain, technology, software and hardware.**


VGA CONN
DB9 CONN for PROCESSOR
HEADSET OUT
MIC IN
TV OUT
RIGHT SPEAK ER
LEFT SPEAKER
USB OTG CONN
USB CONN
RESET SWITCH
5V JACK
POWER ON/OFF SWITCH
CAMERA CONN
MDDR
OMAP 3530
CONTROL SENSOR HEADER
LCD CONN
3.5 INCH LCD
PMIC
NAND FLASH
FPGA EXP CONN (3.3V)
7 SEGMENT LEDs
FPGA
SD CONN
16X2 CHAR LCD
DDR2 SDRAM
FPGA IO CONN (5V)
IO EXP CONN
MODE SWITCH
ADC INPUT
DAC OUTPUT
RJ45 CONN for PROCESSOR
RJ45 CONN for FPGA
DB9 CONN for FPGA
SDI CONN (5V)
BLUETOOTH CONN (3.3V)
GPS HEADER