

Overview of Sustainable Building Design Program – A Curriculum Enhancement Initiative

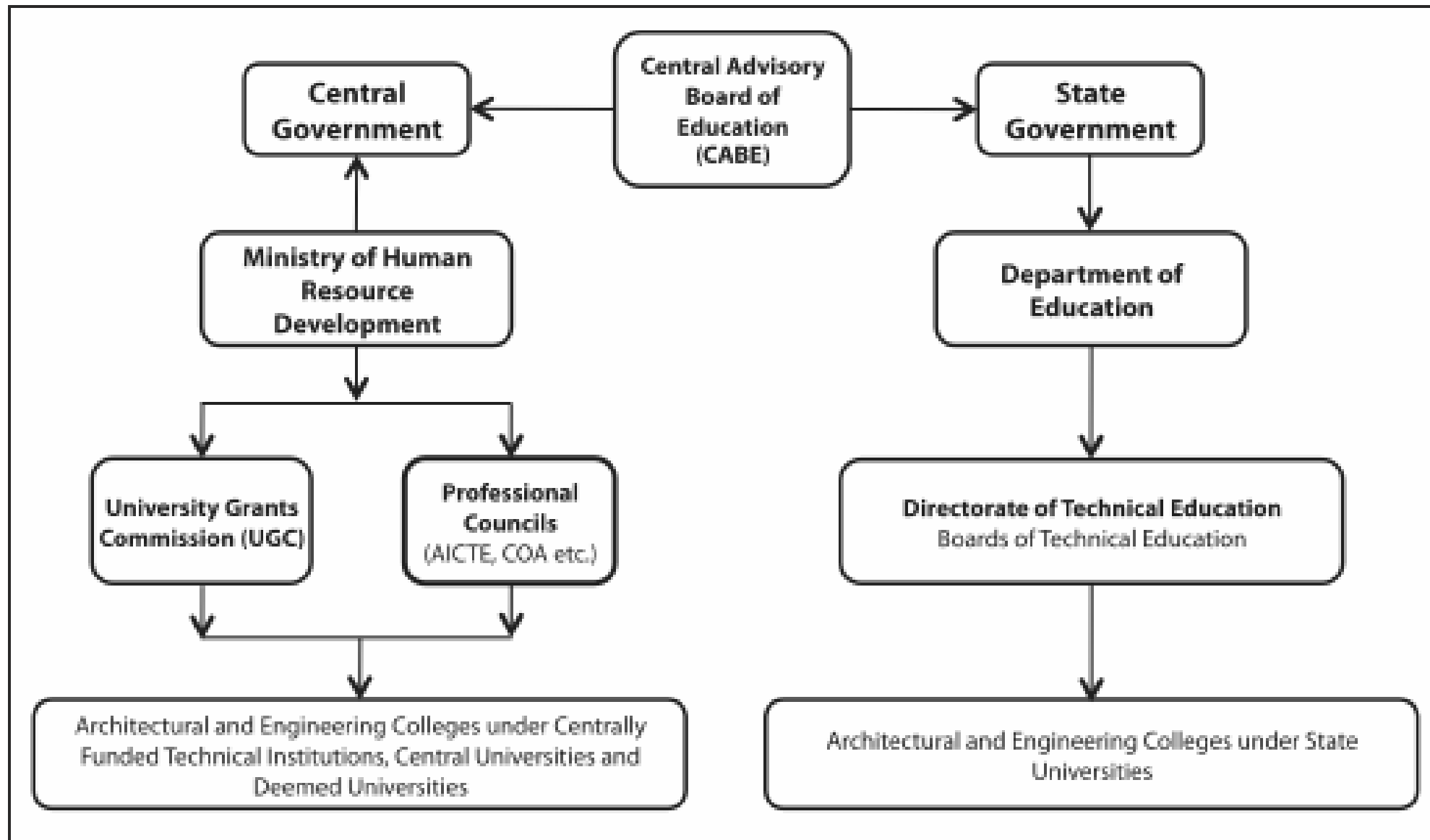
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Chief of Party, USAID ECO-III Project

Train the Trainer Workshop
Infosys Campus, Mysore
August 2nd – 5th, 2010

Educational Curriculum – ECO-III Efforts So Far

- » “E Source Technology Atlas Series” (on Lighting, Cooling, Heating, Appliances and Drive Power) and “Window Systems for High Performance Buildings” to 35 organizations (educational institutes and non-profit organizations) in association with BEE
- » DesignBuilder Educational Licenses to 19 institutes
- » Energy Simulation Awareness Workshops (Indore, Kolkata, Roorkee, and Lucknow) and Three Training Workshops (Delhi, Chennai, and Mumbai)
- » Energy Simulation Software Installation and Awareness Workshops at 19 institutes
- » TOT workshop at NIASA, Pune, Regional Workshop at IIT Roorkee
- » Networking for Energy Efficiency – Workshop in Partnership with REEEP
- » Developed “Getting Started on Energy Simulation” Guide to help the beginners
- » Helped Establish International Building Performance Simulation Association (IBPSA) Chapter in India

Organization of Higher Education in India



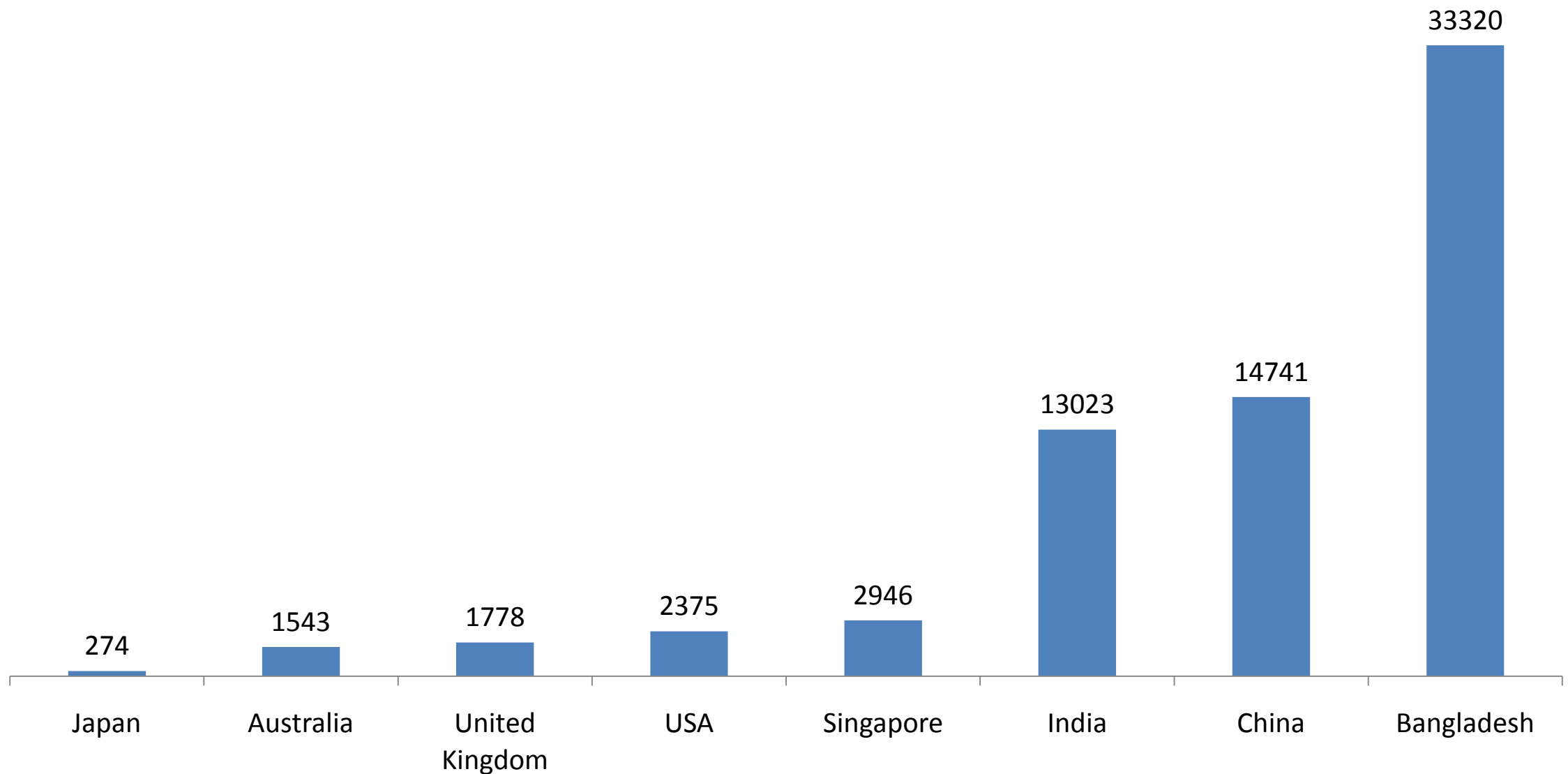
Source: Planning Commission 2009, MHRD

Workforce Employed in the Construction Sector

Labor Force Category	2005 Data (in Thousands)	Percentage
Engineers & Architects	822	2.65
Technicians & Foreman etc.	573	1.85
Clerical	738	2.38
Skilled workers	3267	10.57
Unskilled workers	25600	82.45
Total	31000	100.00

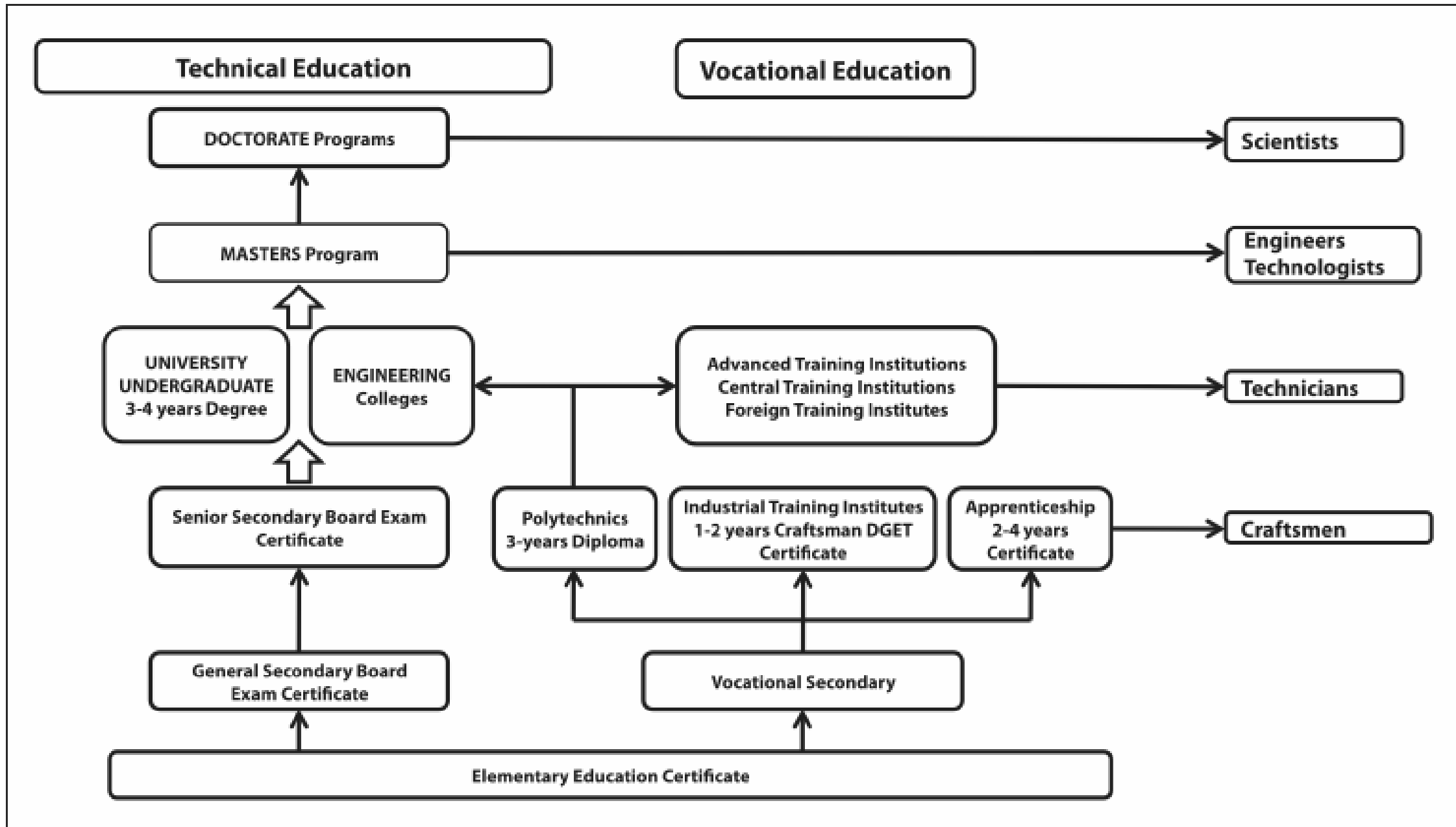
Source: Planning Commission, Government of India

Urban Population per Registered Architect in Different Countries of the World



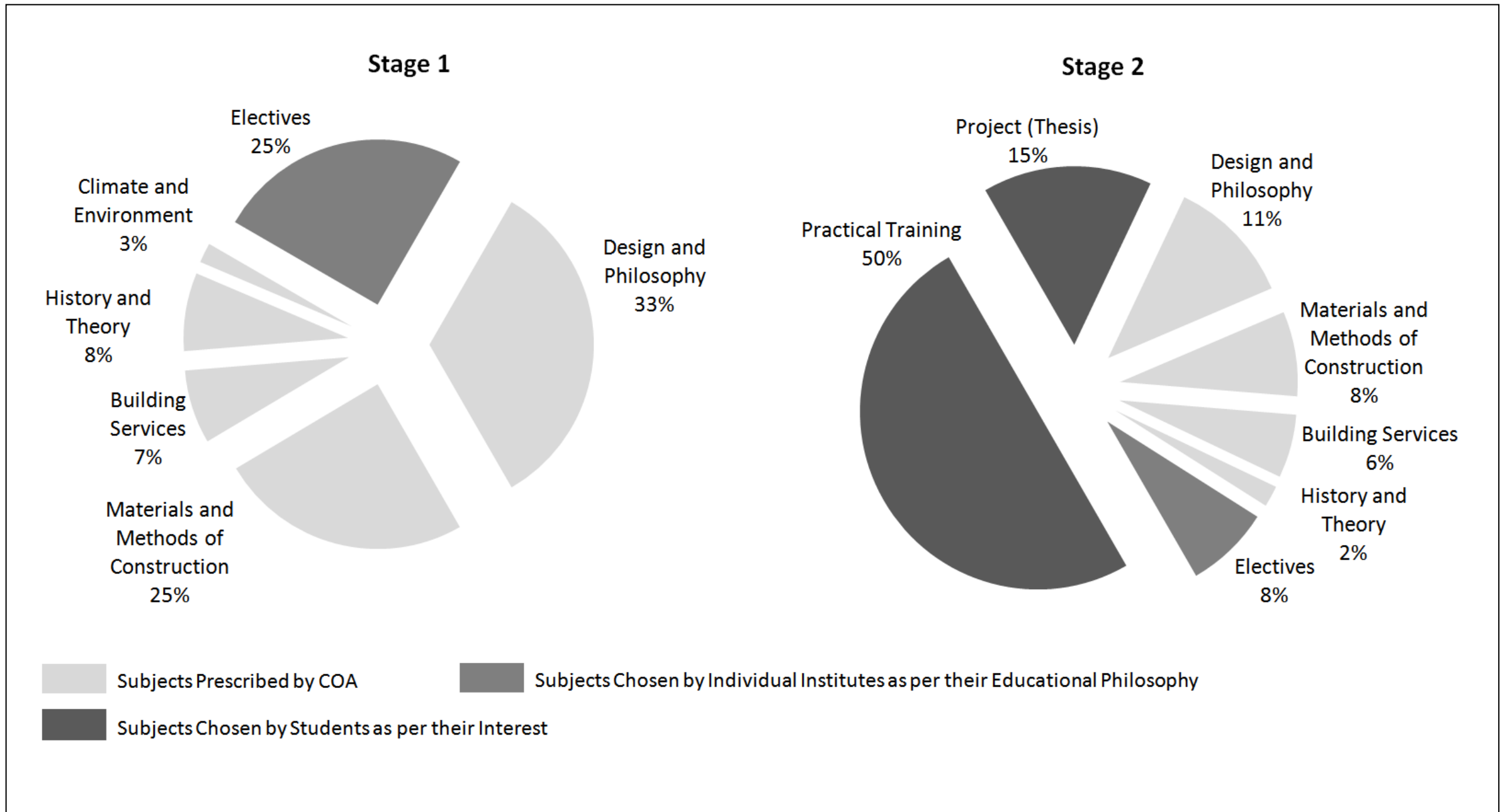
Source: United Nations 2008, UIA 2005a

Structure of Education in India



Source: World Bank 2008

Architecture Courses as Prescribed by COA



Source: Council of Architecture (2008)

Top Indian Institutes in Architecture

TOP 10 IN ARCHITECTURE

Rank	Name of institute	P: Pvt G: Govt	City	Perceptual score
1	Dept of Arch & Planning, IIT	G	Roorkee	977.3
2	SPA	G	Delhi	910.4
3	Sir JJ College of Architecture	P	Mumbai	783.3
4	CEPT	G	Ahmedabad	772.9
5	Dept of Architecture, IIT	G	Kharagpur	756.0
6	Dept of Architecture, BIT	P	Mesra	734.8
7	Chandigarh College of Architecture	P	Chandigarh	618.4
8	Dept of Architecture, NIT	G	Calicut	582.6
9	Dept of Architecture, NIT	G	Tiruchirapalli	533.3
10	Dept of Arch, Jamia Millia Islamia	G	Delhi	485.9

Source: Outlook (28th June, 2010)

Objective Survey (Engineering) Methodology

- » Selection Process (23%)
 - Entrance Exam, Selection Ratio, Fee Structure, Age of Institute
- » Academic Excellence (21%)
 - Student-faculty Ratio, Quality of faculty, Attrition rate of faculty, No. of patents, Faculty Exchange Program, Research and Consulting Opportunity for faculty, Publications by faculty, Post-graduate and PhD programs, Salary of Professors
- » Placements (18%)
 - Percentage Placed, No. of Recruiters, Salary Offered, ROI
- » Infrastructure (21%)
 - Physical infrastructure, Laboratories, Knowledge and residential facilities for faculty and students, Sports facilities, Industry-sponsored laboratories
- » Personality Development and Industry Exposure
 - Co-curricular activities, Student exchange programs, Industry interaction, Number and type of live projects, Entrepreneurship programmes

Source: Outlook (28th June, 2010)

Perceptual Survey (Architecture) Methodology

- » The perceptual survey was carried out in Delhi, Mumbai, Calcutta, Chandigarh, Lucknow, Chennai, Bangalore, Hyderabad and Pune.
- » Field researchers visited many institutes to conduct questionnaire-based interviews among 331 senior faculty members and 357 final-year students from different streams.
- » Another 147 recruiters/professionals were also interviewed. They were asked to select and rank top professional colleges (streams relevant to their field), nationally as well as in their zones.
- » Total marks were calculated by cumulating the ranks given by the three categories (students, faculty, recruiters/professionals) after giving separate weights to each category.

Source: Outlook (28th June, 2010)

Architectural Educational Curriculum Survey

» Objective

- To find out the present status of the curriculum and improvements required
- To find out the importance given to Building Science and Climate & Environment
- Identify the mechanism to build the capacity of institutes as well as faculties

» Status

- **First Survey carried out in 2007**
 - **Findings reported in ACEEE Paper (2010)**
- 2nd Survey (with modification based on feedback) currently going on
- 19 Architectural institutions participated in the survey so far
- Please complete the responses and hand it over to Shruti

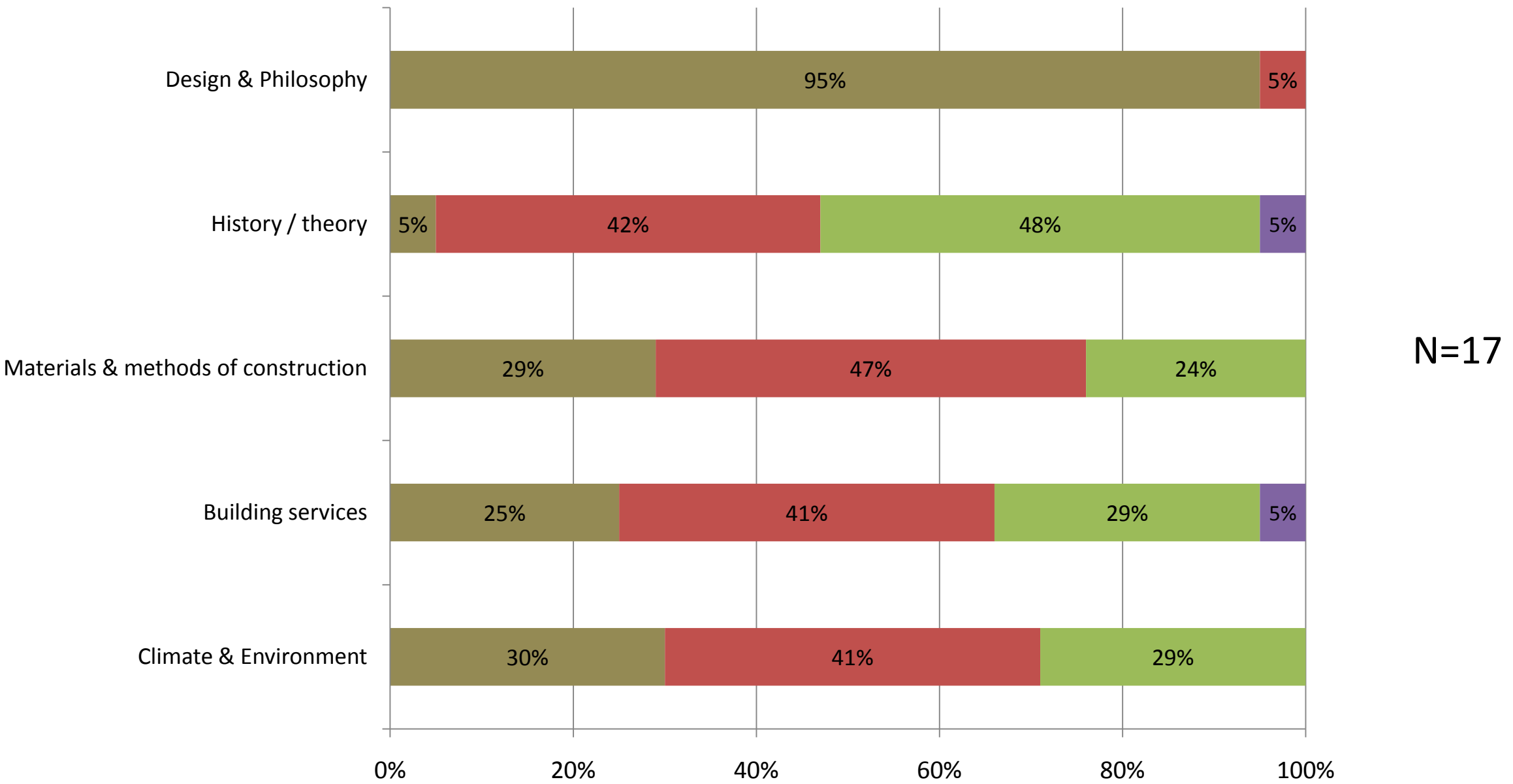


Survey Questionnaire

» 20 Set of Questions Covering

- Details of Architectural programs
- Details of Environmental Sciences and Building Services subjects
- Interest in Integrated Building Design
- Educational Background of faculty
- Availability of laboratory or workshop amenities to facilitate students' understanding of concepts of Environmental Science/Building Services
- Student feedback on new topics that could be offered as courses in the future
- Interest in Exchange Programs
- Awareness of ECBC
- Awareness about Building Energy Simulation?
- Experience of faculty in Green Buildings design and construction projects?

Emphasis on Architectural Subjects



Source: Preliminary Findings from Architectural Curriculum Survey Conducted by ECO-III (July 2010)

Faculty Qualification

- » Qualification of Faculty (Full time + Part Time) Teaching Environmental Sciences and Building Services Based on Initial Responses

	Bachelor's Degree	Master's Degree	Ph. D. Degree	Total # of Faculty Members
Number	66	61	15	142
%	46%	43%	11%	100%

Source: Preliminary Findings from Architectural Curriculum Survey Conducted by ECO-III (July 2010)

Faculty Experience and Infrastructure

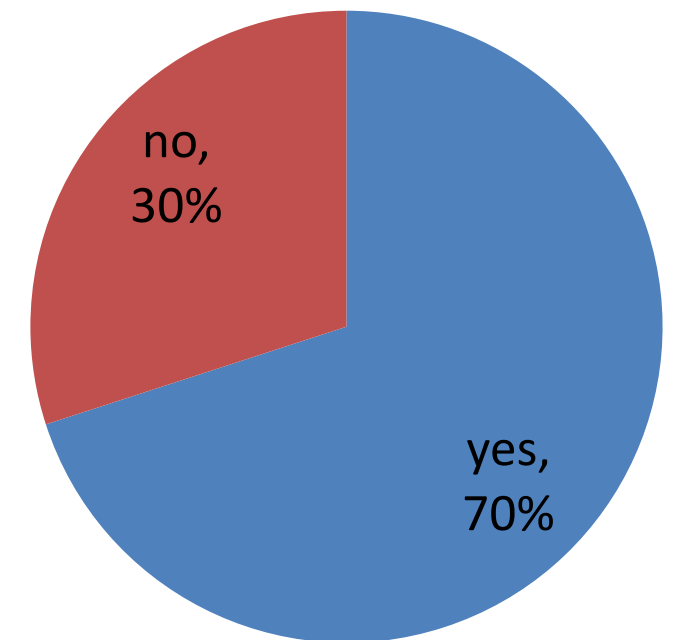
Faculty members involved in Green Buildings/Energy Efficient design and construction projects?

65%: Yes, in Practice

77%: Yes, in Research

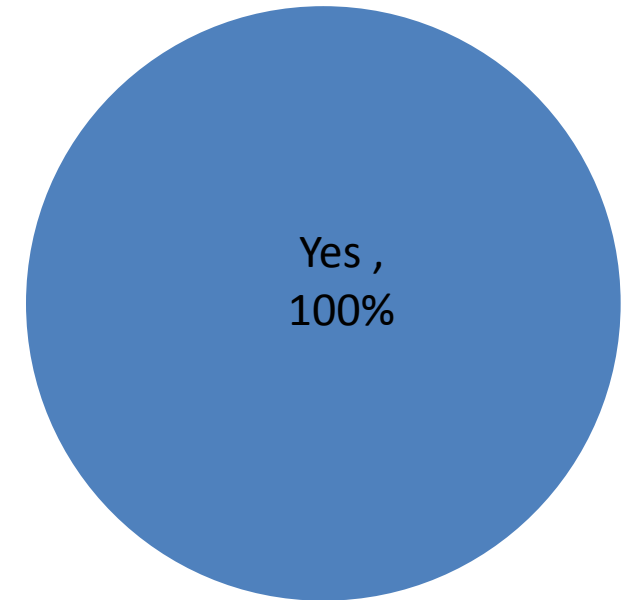
12%: No

Availability of laboratory/workshop amenities to students' understanding of concepts of Environmental Science/Building services?

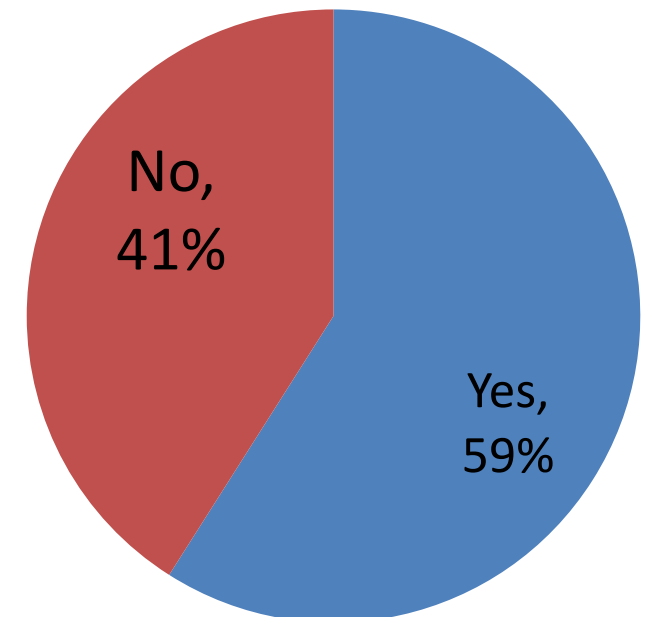


Future Enhancements

Interest in exchange programs (National and International) for students to acquire higher knowledge in Building Technology and Environmental Sustainability?

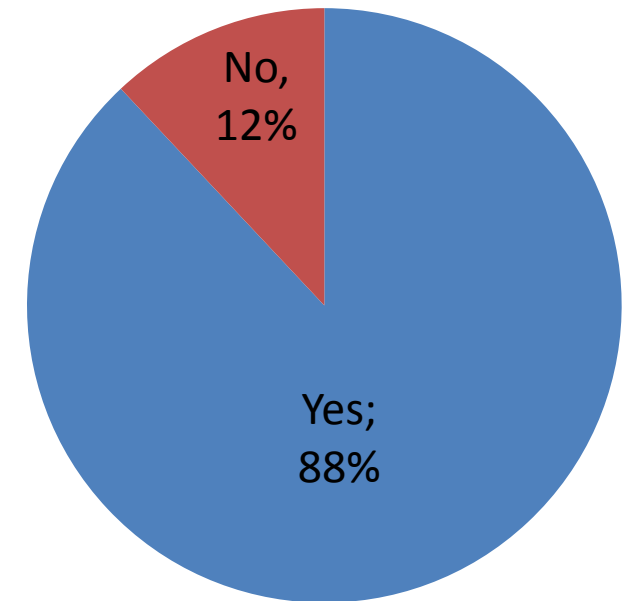


Institutional method to collect student feedback on new topics that could be used in curriculum refinements in the future?

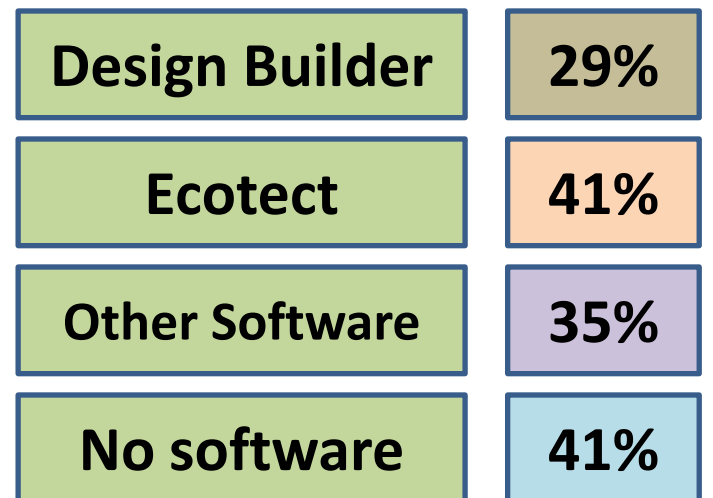


Use of Simulation Tools

Awareness about Building Energy Simulation?



Software tools used for Building Energy Simulation?



Faculty Feedback

» Key Refinements in the Architectural Education Curriculum in view of the current scenario?

- Integration of theory courses and design studio
- Upgradation of courses to reflect technological and market conditions
- Emphasize importance of laboratories and workshops in Design Schools
- Incorporating ECBC in Architectural Design Studio
- Ecological sensitive design and construction techniques to be taken up in the context of city design and construction of buildings
- Focus on appropriate technology, materials and vernacular architecture
- Focus on Integrated design approach, exchange programs
- Climatology and environmental lab to be made compulsory for every institute
- Computer simulation for analyzing the Built Form



Curriculum Enhancement for Academic Institutes

Activities	Implementation	Next Steps
Organization of Regional and Train the Trainer Workshops	Workshops held at IIT Roorkee, Academy and J. J. School of Architecture (Mumbai), and Pune (TOT)	TOT workshop in Mysore in Aug. 2010 Building Physics Curriculum Draft to be launched at Mysore
DesignBuilder and EnergyPlus Software along with E-Source Technology Atlas Distributed	18 architecture and engineering colleges are partnering this effort Provided support to them by organizing ECBC and Energy Simulation awareness workshops on campus	Program Needs to be expanded to another 20 colleges , which have shown interest Working with DesignBuilder Solutions Provider to provide long-term technical assistance and training
Provide Reference Materials on Building Physics	Help create the foundation of future sustainable building designers	Distribute the resources as an incentive to those institutes showing significant progress in implementing curriculum and incorporated the use of energy simulation in teaching and research



Impact of Curriculum Enhancement Over Next Three Years

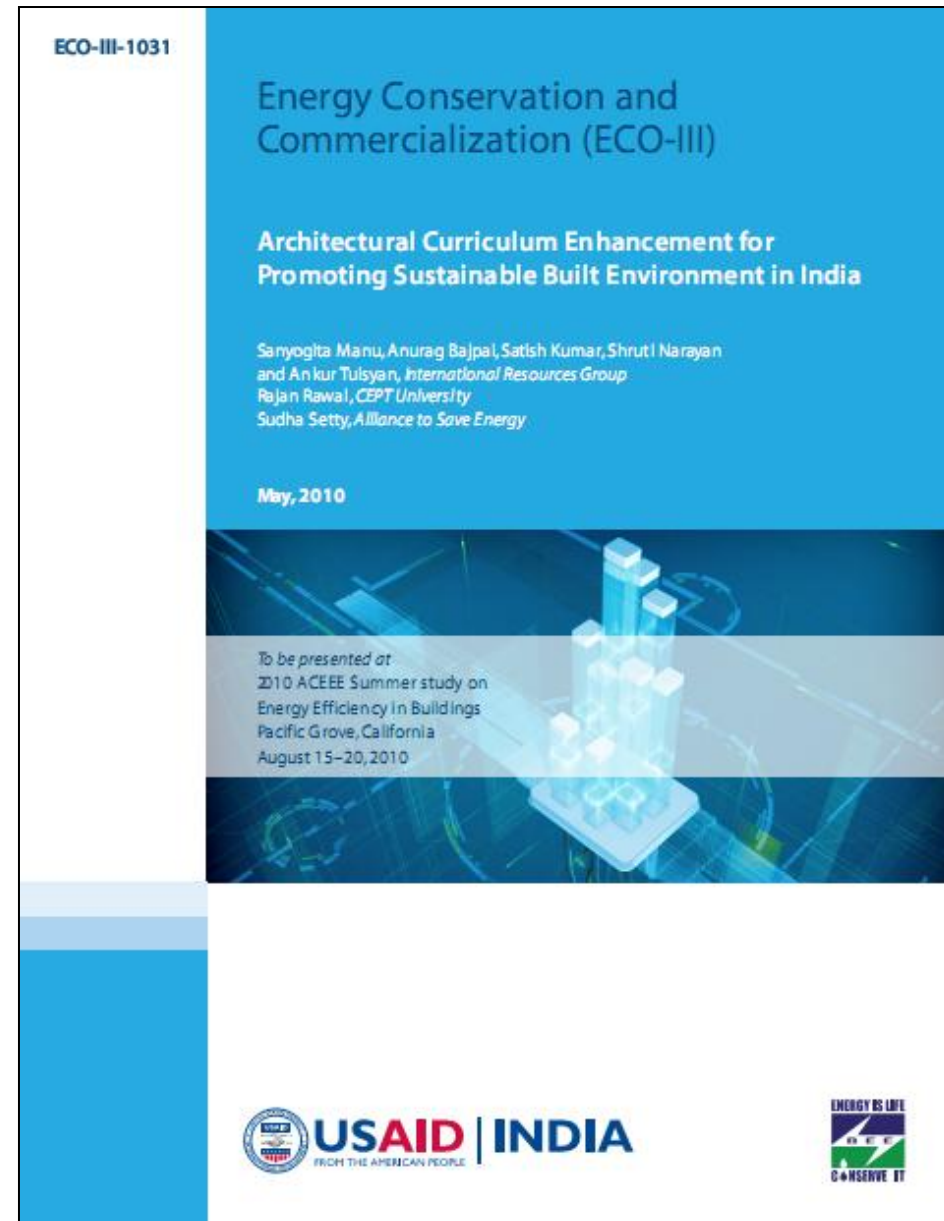
- » Availability of large pool of next generation of professional and faculty members with energy efficiency expertise
- » More number of academic institutions offering energy efficiency subjects/courses
- » Sustainable Building and Integrated Design as the driver for all the new construction (long-term)



Recommendations

- » Based on background research and analysis, findings from the curriculum survey, and the professional demands being placed on the architectural community:
- **Integration of Theory/Elective Courses with Design Studios.**
 - Structuring of a Design Studio to encourage the students to use the concepts learned in Climatology, Building Physics, etc. and incorporate them in developing solutions for the design problem;
 - **Encourage Faculty Members to Conduct Research and Publish.**
 - Recommendation by National Knowledge Commission;
 - Faculty's performance should be linked to the quality of his/her research.
 - **Emphasize Project and Practice Management.**
 - Architects need to play multiple roles and need to lead a design team consisting of many professionals.
 - Project management is an indispensable and basic skill that must be taught by professionals who are knowledgeable and have practical experience.
 - **Infrastructure Improvement (Laboratories and Library).**
 - Help create the to explain the concept of building performance by taking thermal, lighting, and acoustical measurements and performing analysis;
 - Equip the computer laboratories of architecture department with reliable and robust energy, lighting simulation tools and design aids that can assist students in designing and analyzing more complex buildings
 - **Technical Course Content Development/Enhancement**
 - Content development for courses to teach the sustainable concepts from the first principles (e.g. Building Physics, Building Diagnostics, etc.);
 - **Skills Enhancement/Continuous Learning for Faculty Members.**
 - Conduct workshops for faculty members (Train the Trainers) to make them aware about the possibilities of specializing as a sustainable designer, energy efficiency policy expert, building science researcher, etc.;

Architectural Curriculum Enhancement for Promoting Sustainable Built Environment in India



Thank You

Contact Information

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