

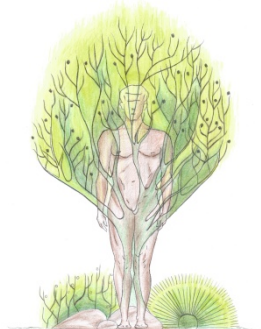
Model for Employment and Enterprise based Skill Development for Bamboo based communities, Artisans, Designers etc for the Bamboo Sector

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Bamboo for sustainable growth

Bamboo is capable of achieving soil and moisture conservation, repair of degraded lands, ecological, food and nutritional, livelihood and economic security because of its manifold uses and industrial applications rendered possible by recent advances in technology



Bamboo has been used widely in Asia, Latin America and Africa for centuries



In many places expensive wood, steel, concrete, glass etc. and other such materials have replaced Bamboo-labeling it as a 'poor man's timber', a 'poor man's building material' etc





Bamboo Liberated!

Bamboo has liberated itself from this stigma and emerged as the 'Greenest of the Green Material'

There is a great market awaiting this beautiful, highly sustainable engineering material



Demand and Supply Issue in the Bamboo Sector

The Material

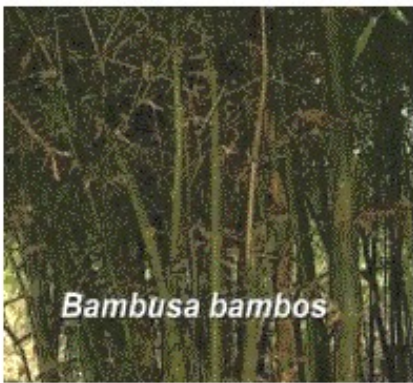
• India is the second largest producer of bamboo in the world with 136 species in 9.57 million hectare of forest and approx equal area under homesteads. Annual production of bamboo in India is about 4.7 million tones

•It is the fastest growing woody plant in the world and hence has the highest rate of fixing carbon dioxide. It is eminently suitable for housing and general engineering because of its high weight /strength ratio, high flexibility and tubular anatomy.

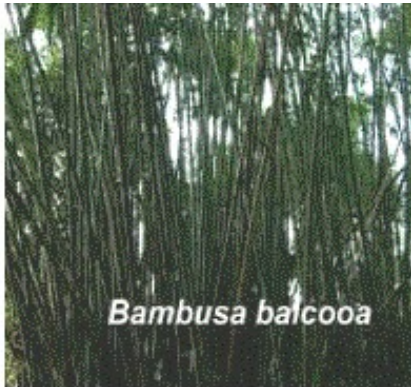
•It is a unique group of giant grasses with the habit of *sympodial* (in tropics), *monopodial* (in sub tropic and temperate)



Melocanna baccifera



Bambusa bambos



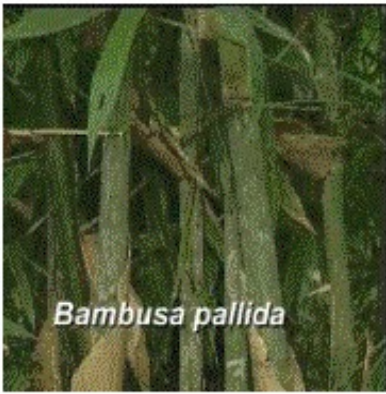
Bambusa balcooa



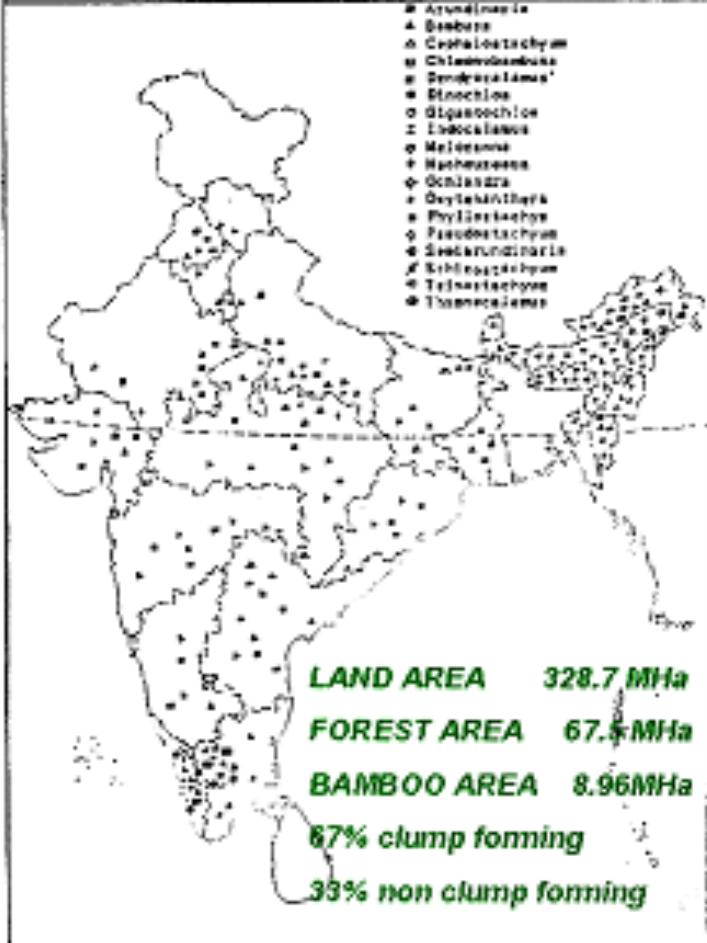
Bambusa nutans



Dendrocalamus hamiltonii



Bambusa pallida



Sympodial Bamboo in Species in India	% growing Stock In forest land
Dendrocalamus Strictus	67
Bambusa bambos	13
Bambusa Pallida	4
Dendrocalamus hamiltonii	7
Bambusa tulda	5
All other species	6

Bamboo based communities

India has several Bamboo based communities who live in villages in forest areas or at the fringes of forests and depend on forests for subsistence. and protected bamboo forests. They use bamboo for construction, fences, weapons, food, daily utility items and crafts.

Bamboo can be made a vehicle of sustainable economic development for these rural and tribal communities to provide them opportunities to earn a sustainable income and improve their standard of living.



The Market

The current and expected size of the market for some Bamboo products are estiamted as below:

Product /Application	Current Market Rate (Rs)	Expected Market (Rs)
Bamboo Shoot	4.8 crores (2001)	300 crores growing at 25%
Bamboo as wood substitute	10,000 crores (imported value)	30,000 crores (in next 20 years)
Bamboo plyboard	200 crorers	500 crores
Bamboo plyboard for use	1000 crores	3408 crores (in 2015)
In truck and railways		
Bamboo flooring	100 crores (Domestic)	1950 crores (2015)
	100 crores (Export)	
Bamboo pulp	100 crores	2088 crores (2015)
Bamboo Furniture	380 crores	3265 crores (2015)
Building and construction Material		
Scaffolding	-	861 crores (2015)
Housing	-	1163 crores (2015)
Roads	-	274 crores
Bamboo grids	-	1000 crores (2015)
Tiny and cottage industry		
Agarbatti,Micelleaneous(Ice cream sticks, fire crackerLathins, ladders,etc.,) Pencil IndustryMatch Industry	394 crores	600 crores (2004)



The Products



Bamboo House

Employment and enterprise in bamboo sector

Demand scenario

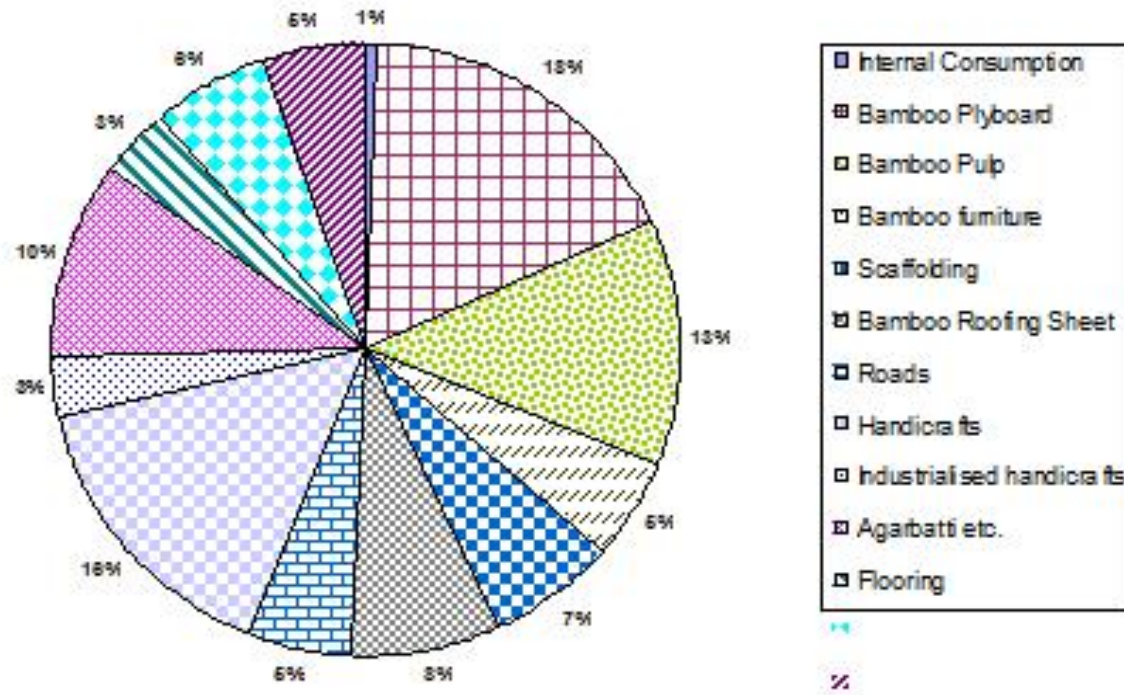
Due to the latest developments, Bamboo poles and its products are in high demand for various uses, from housing, paper, textiles, handicrafts, agarbatti, life style products, energy etc

The acceptability of the products will depend upon:

- Bamboo products being cheaper than other substitute materials like wood, steel etc
- Bamboo products being more durable and aesthetical;
- Mass usage of bamboo in government projects as demonstrations;
- Community appreciation of bamboo as a sustainable livelihood crop;
- Acceptance of bamboo as a preferred material for lifestyle products for the high end market etc and several such factors.

Growth of Industries-----Demand-----Acceptability

Composition of the industry at the end of 2007



Supply scenario

- The designs and products range which Artisans produce are mostly traditional products and the productivity and quality is generally poor due to several reasons, viz.
 - Lack of knowledge of preservation and treatment (products produced by using non-treated bamboo) ;
 - Lack of knowledge about tools, jigs hence poor joinery techniques;
 - Lack of knowledge of high quality finishing;
 - Lack of knowledge on various product designs & technologies
- Bamboo as a material does not figure in the curriculum of architecture, engineering and design institutes or in the polytechnics, with the result that its usage in designed buildings and products is very low
- The gap between the finishing quality and design of the traditional products and the market demand is huge



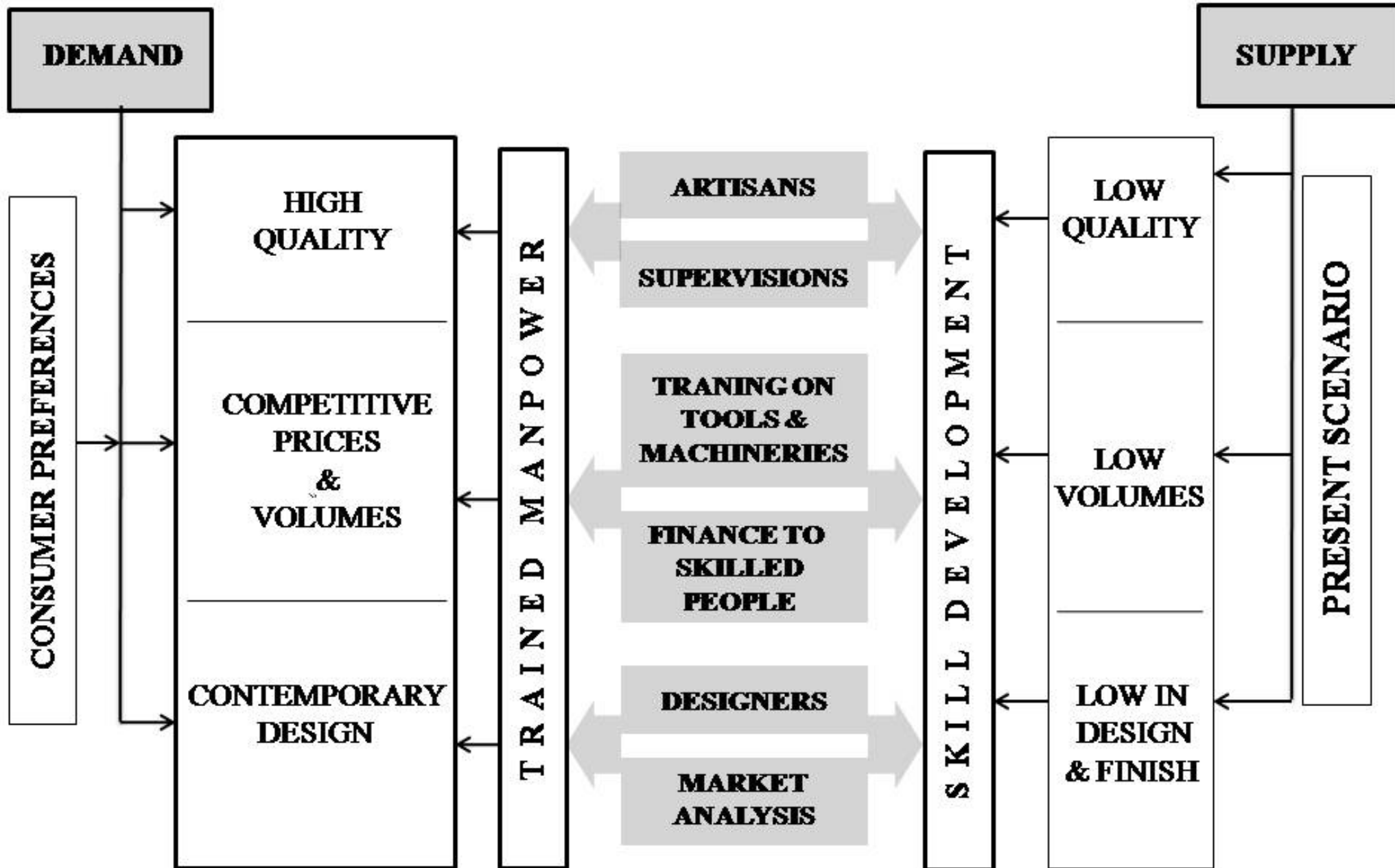
The Missing Link-----?????

DEMAND ????? SUPPLY...

**... is the serious dearth of
Human Resource
at every level of the value chain!**

***A comprehensive and structured Skill Development Program combining
basic education and vocational course is the need of the hour.***

System Model of the Demand-Supply link



Skill Development

What is skill development?

- Skill development refers to employability which is required at every level of the value chain.
 - Shortcomings in skill development is the single most constraint to healthy and rapid growth of our industries and economy in general. This situation is even more serious for the bamboo sector where it is still not recognized as a fully fledged industry.
-
- **Skill is not about Education, but about education for employability.**
 - **This requires bringing vocational and formal education together.**
 - **This has to be approached from the lowest level and vertically linked to higher education at University level.**

Skill development and the bamboo sector

- Communities in India have various traditional skill sets in working with bamboo. Several states of India are ideally suited for development in various sectors of Industrial Development and Tourism dependent on forests. Due to geographical factors and nature of the existing industries, industrialization is presently concentrated in the border areas of these states, whereas the other areas have been relatively unaffected by the process of industrial development
- Bamboo is an important resource available in most parts of India
- Skill Development in Bamboo can be the means by which the industry and the community can be integrated profitably, since bamboo generates large scale rural employment in the management of bamboo forests, harvesting, collection, transport, storage and processing
- The skill development will need to connect to the industry and demand, and curriculums will have to be devised according to the needs of the industry

Focus in skill development programs

In all the skill development programs, focus has to be on three major issues:

- Capacity building of the artisans
- Product diversification
- Linkages and market tie-ups



Skill Development Model for the Bamboo Sector by CGBMT- Center for Green Building Materials and Technology, Bangalore, India

CGBMT-- The Organization

- CGBMT is a trust registered under societies Act, engaged in Eco-literacy and Eco-education programs for over a decade.
- It touches upon a wide range of aspects of sustainable development, i.e., social, economical, environmental, eco-friendly materials, processes and technologies for various sections of the society.
- It conducts awareness programs, workshops, short and long field training programs and courses etc for school children, women, artisans, architects, engineers, designers, corporate and officers up to policy level bureaucrats.
- CGBMT has developed structured courses specifically for skill development for the bamboo sector called **BAT Bamboo Application Technology** courses and has been running them for the past 4 years



Vision of the Model for Bamboo Application Technology courses -----

“ Bamboo for Integrated Environment friendly Development through generating quality employment and opportunities for the masses”

- Introducing bamboo as a potential material of economic activities, through awareness programs, seminars, workshops, 1-2 days short courses, structured courses etc. as a concentrated effort toward mitigation of the adverse effects of mindless development for artisans, general public, architects, engineers, scientists, policy makers etc.
- Through these programs , generate workforce for the bamboo sector i.e. bamboo based buildings, furniture, handicrafts, bamboo based industries etc. through structured courses of varying duration and levels through distance education program.
- Education and upliftment of living standards of rural and tribal population by teaching them better and scientific ways to build their homes with locally available materials using bamboo and providing livelihood security through training for management and utilization of resources available to them i.e. introducing bamboo based cottage industry or other small scale industry based on forests.

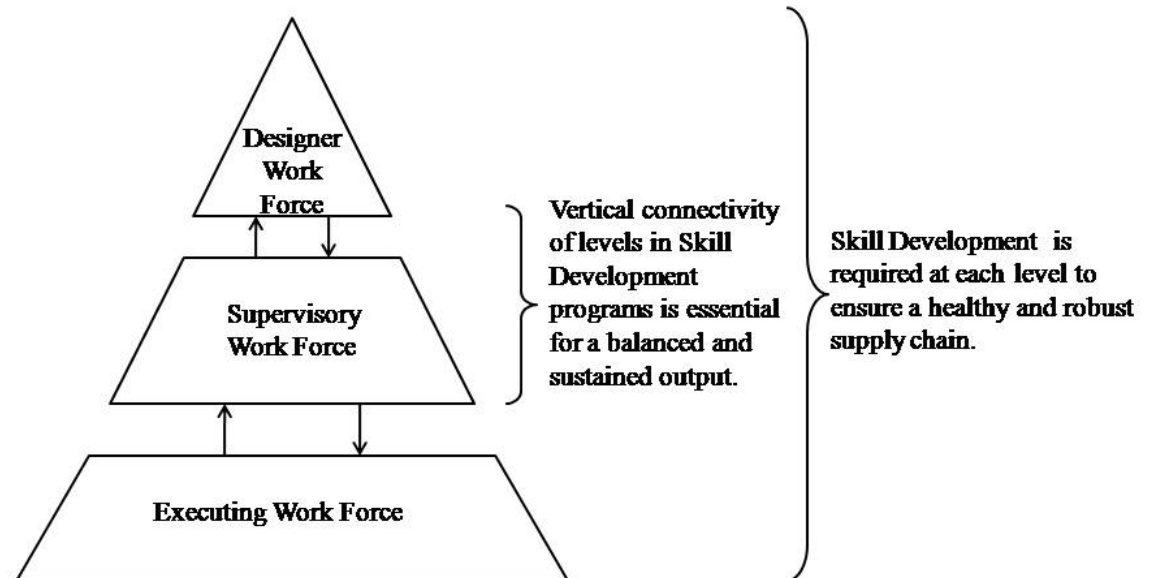
Objective of the Model

- The overall objective of the programs is to improve productivity with quality, income for artisans and leading them towards producing market oriented quality products, thereby ensuring economic, efficiency, environmental and social benefits-a win-win situation for all the stakeholders.
- Provide appropriate training and support for improved quality and productivity, and enable them “access” to a larger market segment for utilitarian products.
- Up-gradation of skills of artisans through appropriate designs and technology intervention by vertically connecting the designers and experts with the executing and supervisory workforce.
- Improve the competitiveness, to gain access to new market, to develop new products, thereby generating positive growth and employment.

Outcomes Envisaged from Hypothesis and Method

Through the proposed training activities, CGBMT hopes to be facilitating the:

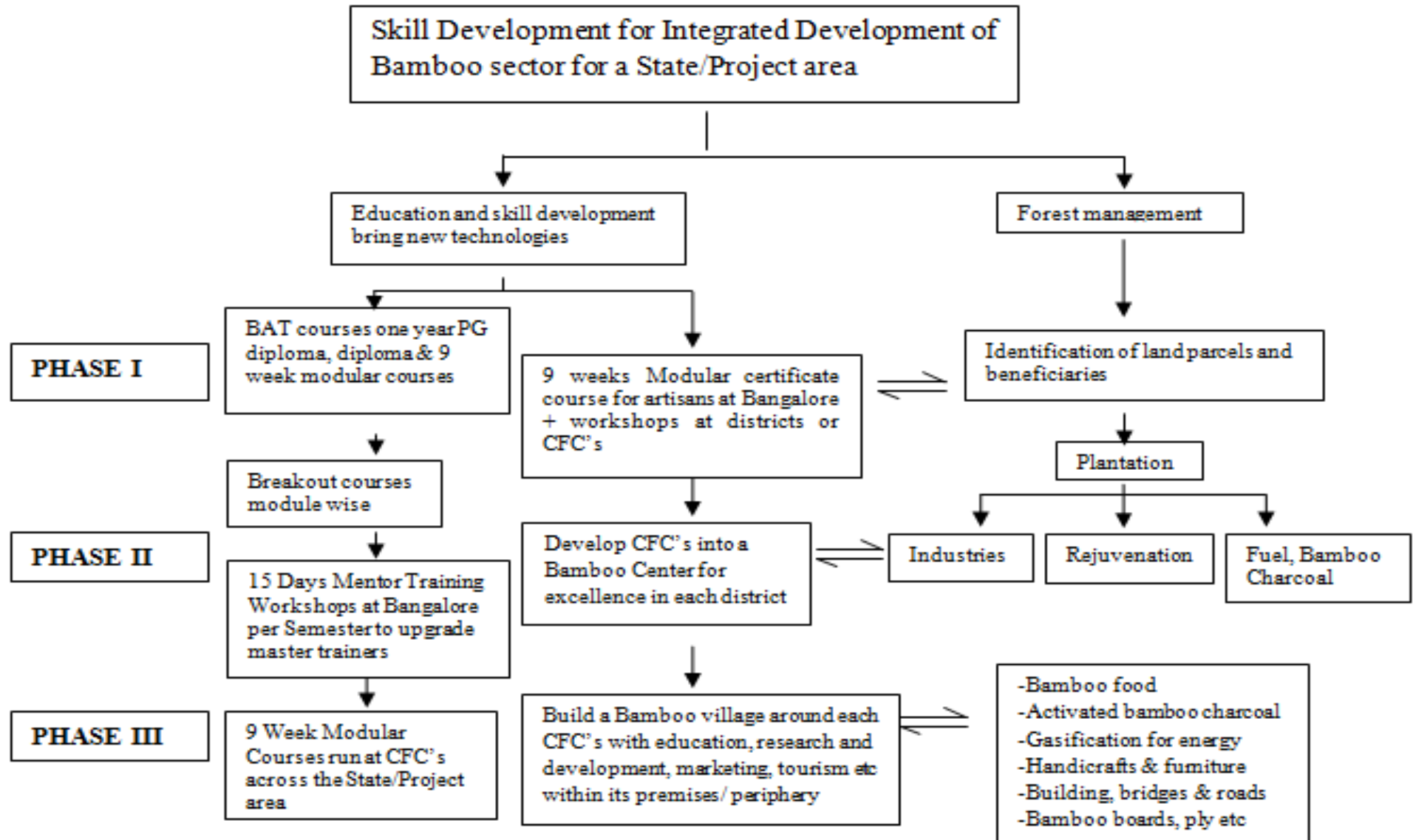
- **Transforming “artisans” to “entrepreneurs”** by introduction of new designs and technology, providing training for the up-gradation of skills to the community members, building their entrepreneur skills, creating awareness about the market potential, introducing the tools, jigs to increase the quantity and quality of production. This will facilitate the community to venture into Bamboo sector and will provide alternative employment opportunities to the rural community which will gradually reduce their poverty.
- Generating supervisory level workforce to ensure quality in production by introducing diploma level programs.
- Introducing architects, engineers and designers in the sector to ensure new and contemporary designs and products of national and international level to increase the competitiveness of the products through online PG programs with series of contact workshops, executive programs etc.
- Vertical interaction among the three levels



Methodology and Execution of Programs - The Collaboration Approach Models

CGBMT understands that Skill development of this quality and scale cannot be done by a single organization!

A Systems approach for Skill Development of Bamboo Sector



Tripartite agreement:

A University or organization and CGBMT can sign a tripartite agreement with Government body/State Bamboo Missions for the skill development program to impart training to the artisans on a continuous basis. The three parties can share the responsibilities as follows:

University/Organization-The Administrator: The University can provide the administrative infrastructure and facilities for running the courses on a continuous basis from its study centres.

CGBMT-The Knowledge provider: To develop the course and course content, provide mentor and facilitator training and provide all technical support for running the courses.

State Bamboo Mission/Organization-The Facilitator and Financier: To provide students for the course through its various depts., facilitate and finance the courses to be run; and create employment and enterprise for the benefit of the bamboo sector of the state.

As a continual process, CGBMT will study the state/region/project area in terms of demographics and resource availability, climate, market linkages etc to tailor the course and its strategies for the training program in of the state. CGBMT will coordinate with other organizations and NGO's in the state for selection of target members who are involved in the traditional bamboo sectors.

These resources also have the opportunity to become mentors to conduct training program at various locations in the states/region/project area.

In this way in five years, the state will have sufficiently trained workforce at each level and can spread the model throughout the state in a sustainable manner without outside help.

MoU with ITI, polytechnic institutions:

To ensure good quality buildings and products in the bamboo sector, excellent supervisors are a must. Hence CGBMT is trying to work with these institutions to introduce the courses developed by CGBMT at Diploma level with appropriate customization and approval from the technical bodies.

MoU with technical Institutions:

CGBMT is aiming to introduce bamboo and its technologies in the curriculum of various architecture, engineering and design institutions. CGBMT can sign MoU with the institute to design the syllabus, course material and content development, practicals and training programs and help setting workshops etc. This will ensure people in the upper segment of the bamboo sector at the design level.

Collaboration with NGOs

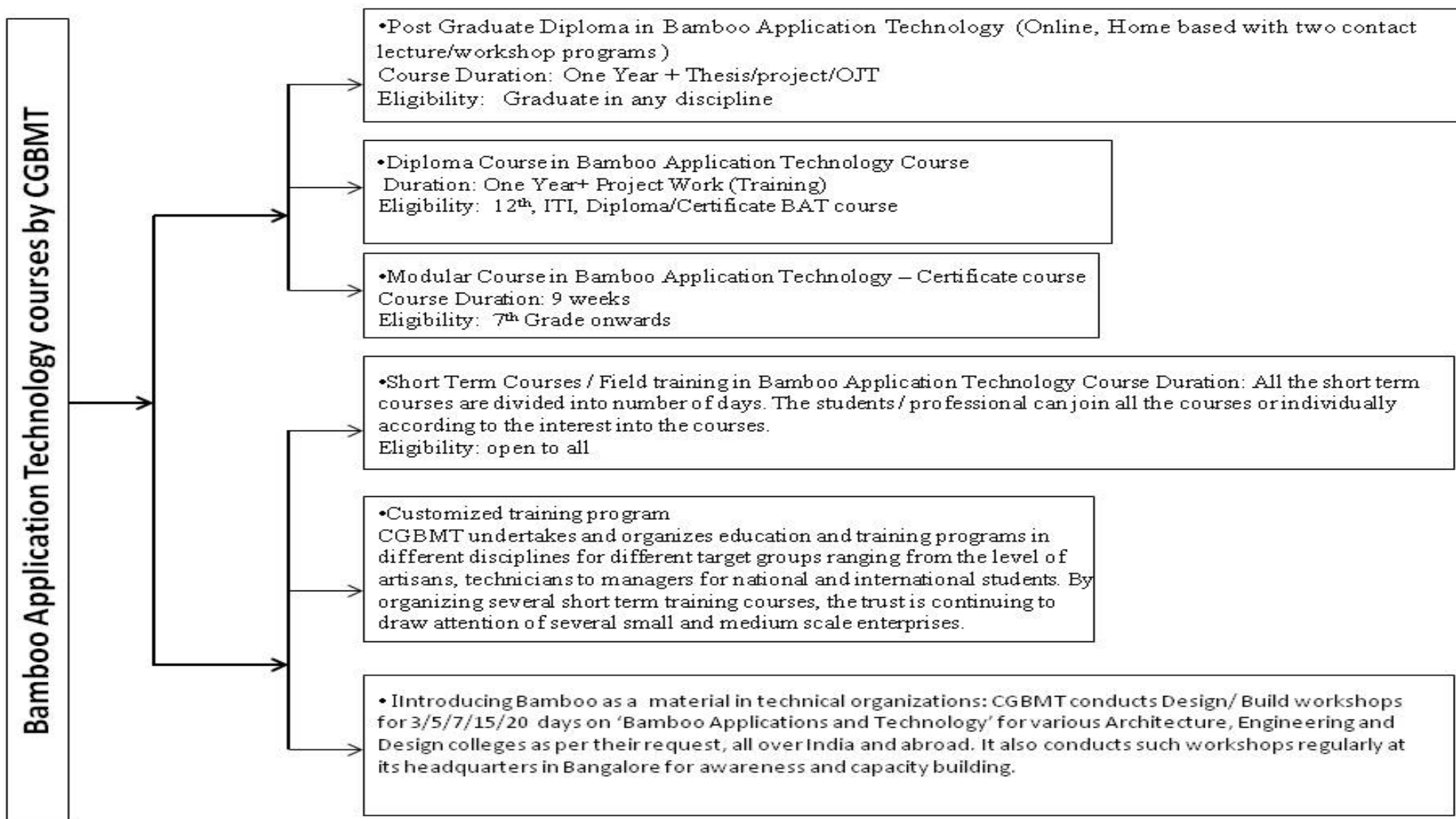
CGBMT can collaborate with NGOs to reach the sections of the society in far flung rural and tribal areas for the benefit of these communities.

Collaboration with Resource Persons and Organizations

For running the courses for skill development CGBMT has collaborated with various eminent organizations of the bamboo sector as our resource organizations. CGBMT organizes student visits to these organizations for lectures, demonstrations, practical and hands on workshops and in reciprocation work as their resource organization on mutual benefit basis. To name a few IPIRTI, Bangalore, Indian Wood Science Institute, Bangalore, Grow more Biotech pvt ltd, Pointech pvt ltd, National Institute of Design, etc. CGBMT has also networked several individual experts in the field as resource persons for its skill development programs

Bamboo Application Technology courses by CGBMT

CGBMT has developed different types of courses in Bamboo Application Technology for different levels of education and eligibility of the candidate. The eligibility starts from 7th standard class to UG level students





Combined visit to plantation by BAT students



A lecture on Disaster Management at CGBMT center for BAT students



Bamboo workshop for Raffles School of Design, Bangalore



A visit by foreign students delegation from France and Switzerland



Bamboo workshop at Mulhouse, France for Ecole Arts School, Paris, Hyper works, BasEl, Switzerland and Media School, Offenburg



Annual day Celebration at CGBMT center with Dayalbagh University and Madhya Pradesh Bamboo Mission officials



Demonstration on treatment of Bamboo for Modular Course students at Madhya Pradesh



Bamboo workshop at Trichy, India for C.A.R.E. School of Architecture, Trichy and Aarhus School of Architecture, Denmark.



Mentor Training programs for the courses for various states/organizations etc

- The first training program is for 9 weeks at CGBMT 's center at Bangalore to train the master trainers, mentors and facilitators for the courses.
- These trained artisans can be the mentors, facilitators and trainers for running courses at various Centers/ CFC's in the states/organization in the next phase and can also manage the centers.
- From second cycle onwards 15 days Mentor Training Program are held at CGBMT, Bangalore every semester to continuously upgrade the knowledge and skill of the mentors, facilitators, and trainers, who in turn train other artisans at various locations in the state.
- This model can be further replicated in each state forming a network of study centers/CFC's across the country. The courses can be customized for each state depending on the species of bamboo available, climate, traditional technologies available , culture , market etc of the state.
- All of the above courses can be integrated in the mainstream curriculum through a university/ organization, starting at the lowest level , so that at every level a student can exit and still be employable at that particular level. After gaining experience in the market he can again join for the next level courses and upgrade himself by joining either as a fulltime or part time student as per his convenience.

Collaboration with Dayalbagh Educational Institute (DEI)

CGBMT had approached Dayalbagh University for collaboration in 2005 and also constructed a prototype shelter in bamboo for proof of concept for the performance of the material

- Compulsory Core Courses like Rural Development and Agricultural Operations and skill-based work-experience programs related to the major courses of study at under-graduate program level are two of the outstanding features of the DEI**
- It is a unique and only Institution of higher education which caters under one umbrella to education right from primary, secondary, tertiary and higher levels in a holistic manner**
- The Institution allows mobility between formal and vocational streams of education and employability with a network of Centers conducting short duration, focused modular programs across sectors and the country to bridge skill gap and provide trained manpower to various service sectors in India**



Need of the hour

- To introduce skill-based activities as part of the curriculum from primary levels
- To relate the type of education with the requirements of industry
- To build an effective skill-delivery framework
- **To exploit skill-based education fully by provision of multiple entries and multiple exits, with multiple lateral transitions between vocational and knowledge-based (conventional) education systems.**
- **To build a mechanism wherein an individual's skill and experience can be used as a launching pad for entrepreneurship**

Some pathways to skill development & enhancement at DEI

- **Certificate Courses:** for students who are interested in enhancing their skills and getting self-employed after Class VIII
- **Modular Courses:** short duration (≤ 9 weeks) courses for updating, upgrading and development of complementary and supplementary skills
- **Community College:** Short duration, focused and modular courses with emphasis on hands-on training
- **Diploma Courses:** entry is either after Class 10 or after Class 12
- **Bachelor of Vocation (B.VOC.):** offered in (1) Apparel Manufacturing and (2) Food Processing & Preservation
- **Continuing Education Programme**

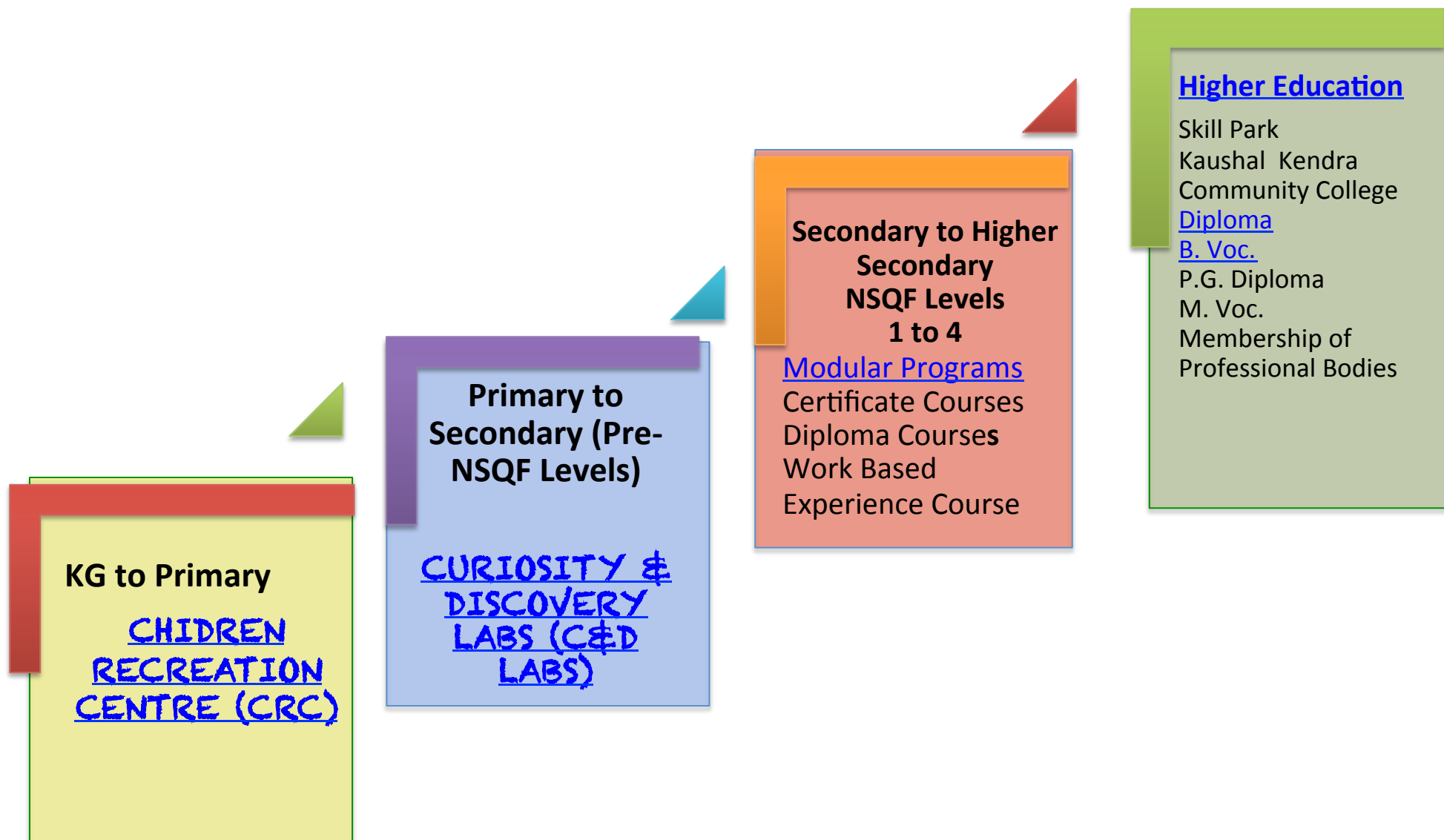
Tripartite Agreement with Dayalbagh University

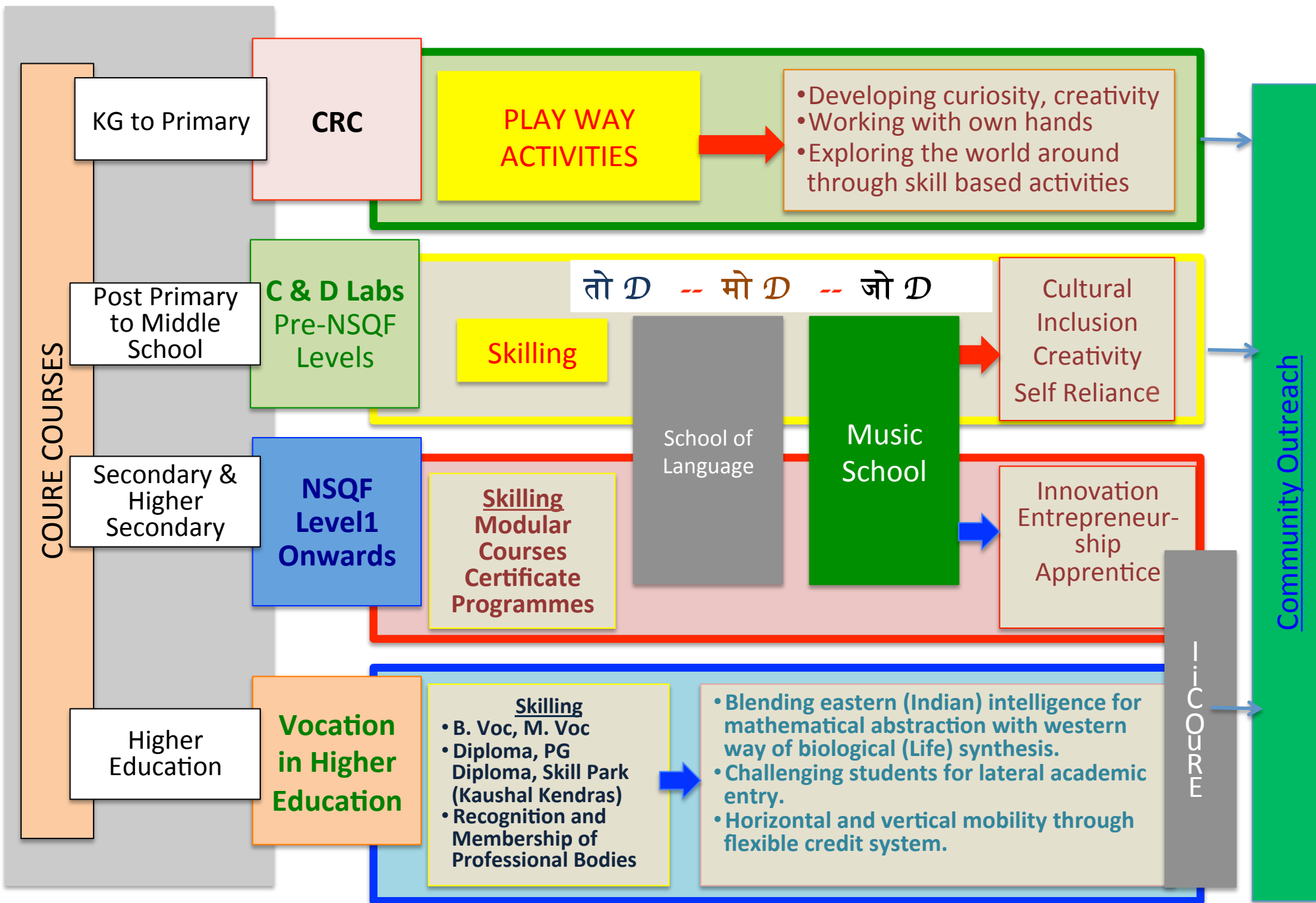
CGBMT signed a Tripartite agreement with Dayalbagh University for running Bamboo Application Technology course s with MP State Bamboo Mission in March 2014



The Dayalbagh University Model of Skill Development

Stages of Skill Development in DEI





Integration of Skills at School Level (KG to Higher Secondary)

Integration of Skills in Higher Education

Laboratories

Lab on Land

Virtual (Reality) Lab

Simulation Lab

Remote Triggered Lab

Instructor Resource

Audio & Video

Multimedia

Power Points

Cloud

Learner's Resource

E-books in regional languages

Skill-pedia

Instructor & Learner Resource

Question Bank

Case Studies

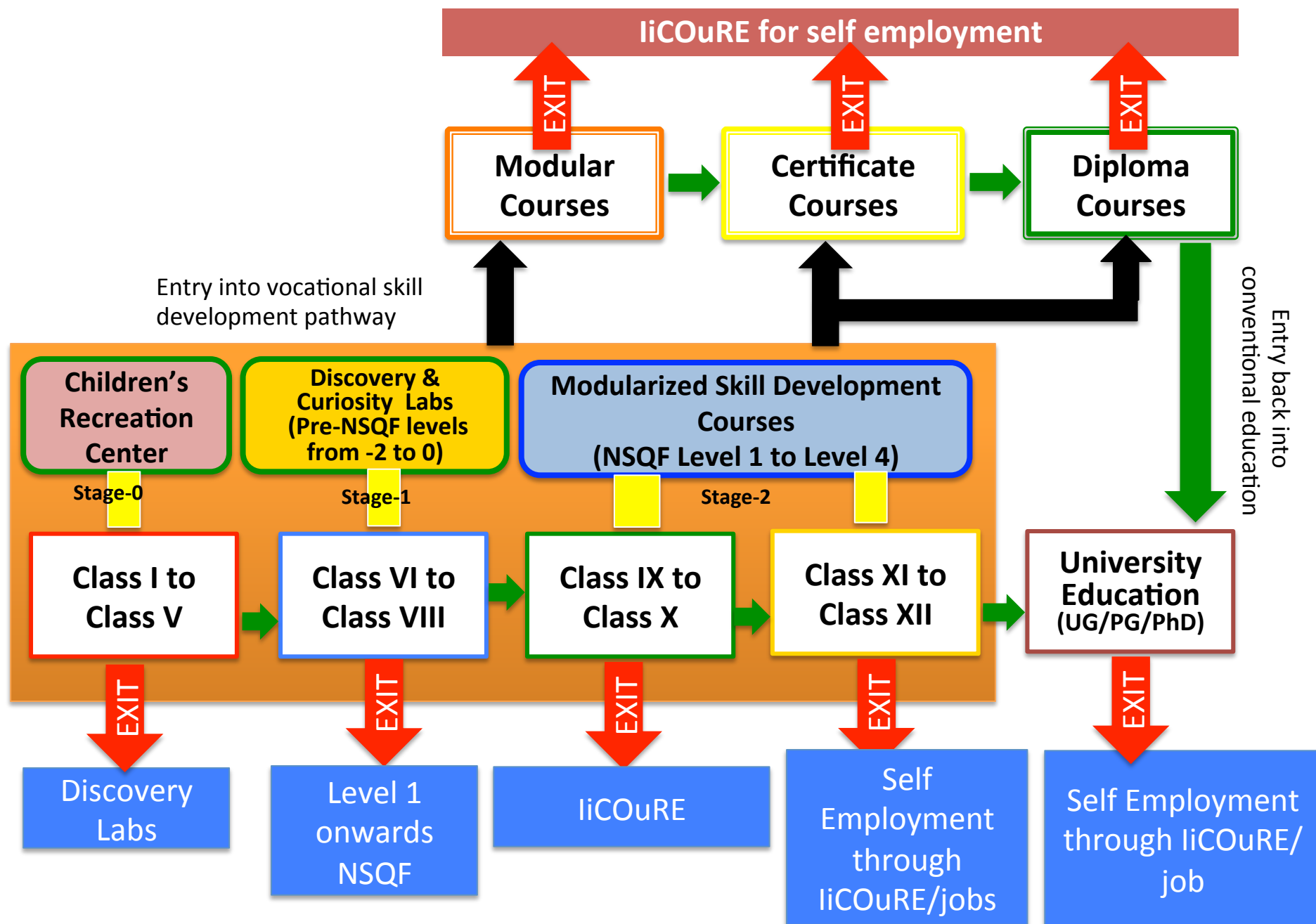
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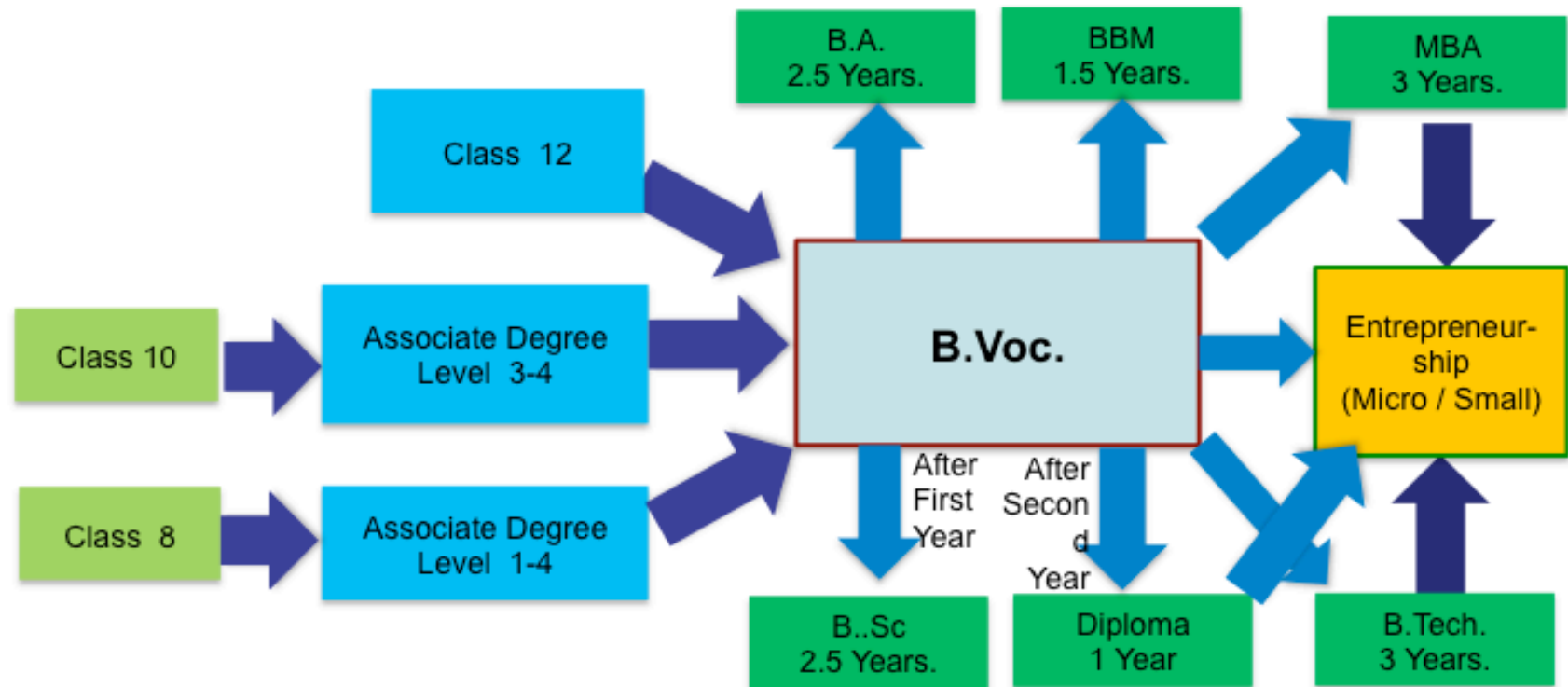
Knowledge bank

MOOCSKENE
BHARAT
मुस्काने भारत

liCOuRE

Community Outreach



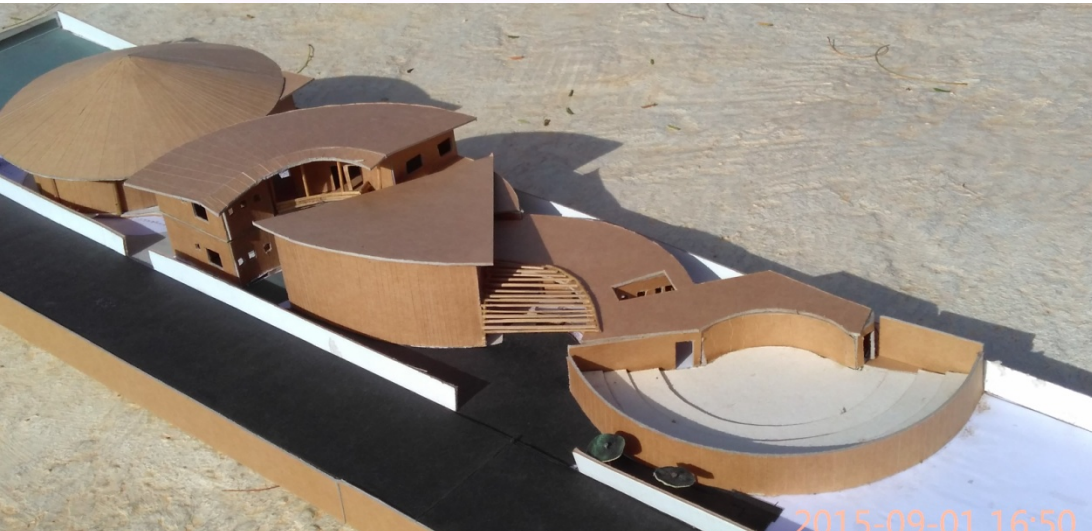


Various avenues to and from B. VOC.

Bamboo Centers of Dayalbagh University

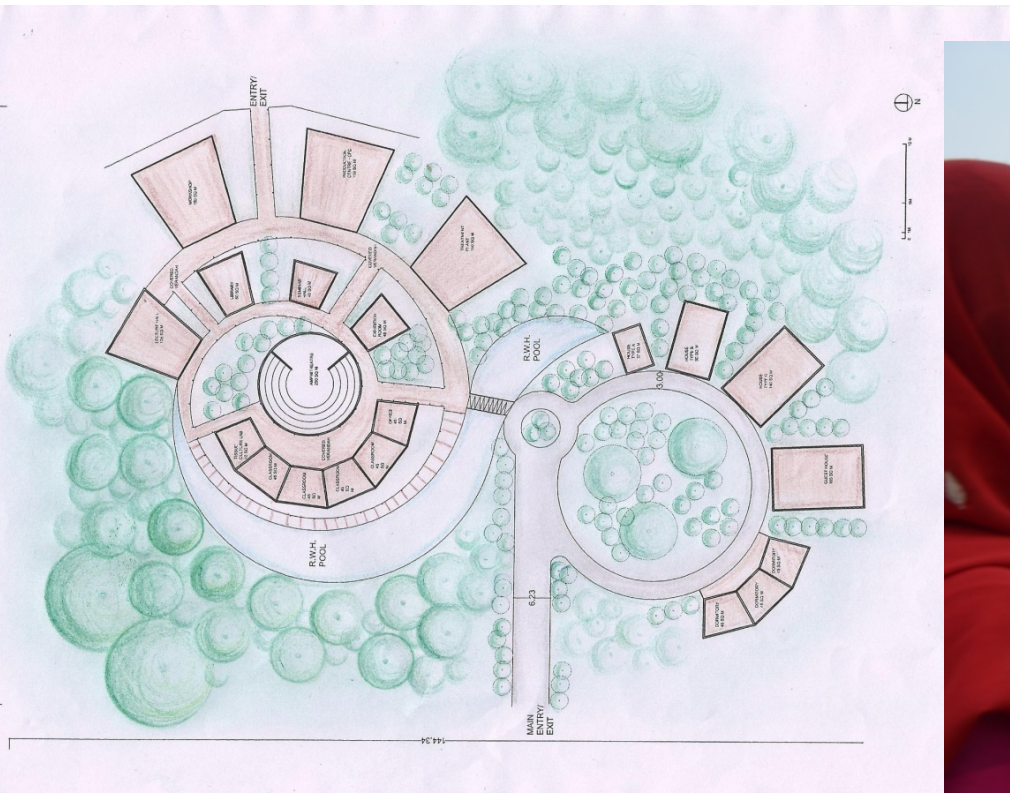
Dayalbagh Bamboo Center

It is being set up in a 1.15 acre site in the University campus at Dayalbagh with approximately 16,000-20,000 sq.ft of built up area with classrooms, Lecture Theater, library, tissue culture lab, workshop, plantations of various species etc



Rajaborari Bamboo Center

The University is also planning to have its main bamboo center at a 8000 acre Rajaborari Forest Estate in Harda dist of Madhya Pradesh in a sprawling campus, where it has been running educational institutions at different levels since 1935 and has an ICT center with Educate facilities



Amritsar Bamboo Centre

- During the month of May 2015 in Dayalbagh University and CGBMT completed a 1500 sq.ft. guest house for DEI-ICT, Amritsar campus in a record time of 15 days thus marking the establishment of the Amritsar Bamboo Centre
- The community workshop was spearheaded by CGBMT experts and artisans along with ten trained artisans with their mentor from Rajaborari Bamboo Centre, about fifteen DEI lecturers, Dean and other staff, with twelve students of DEI Amritsar Campus, some local residents and sixty to sixty five unskilled masons, carpenters and laborers, a textile designer, interior designer and women from local village
- Success of this project is reflective of the progress of the Model in solving the supply and demand connection, as it brought together all stakeholders from policy makers to artisans- a working model of human resource generation in the Bamboo Sector



DEI-DEC Study centers in India

- Dayalbagh University has over 90 study centers in India and abroad through which it runs its distance education and vocational training programs to reach the most marginalized sections of the society
- In Madhya Pradesh, CGBMT is running the modular bamboo courses from its six centers
- It is planning to run this course through its study centers in other states like Kerala, Gujarat, Assam, Meghalaya etc very soon

Collaborations with Technical organizations

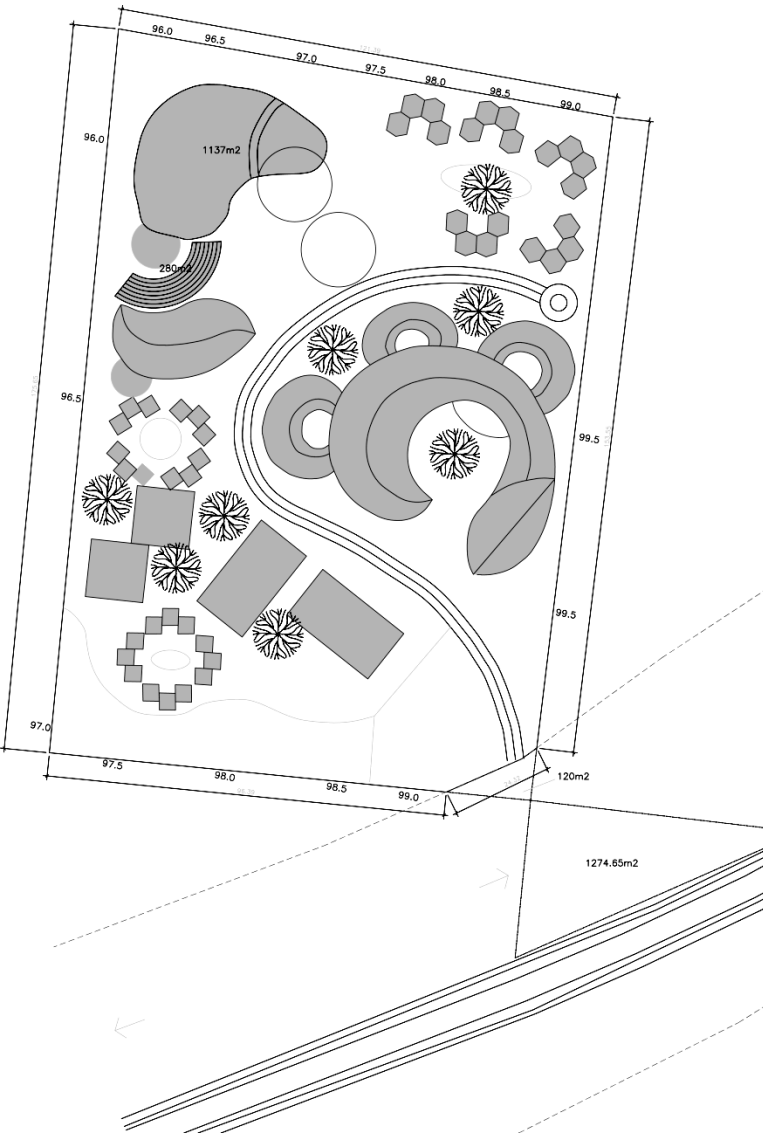
- CGBMT signed an MoU with School of Planning and Architecture, Bhopal in 2014 for introducing bamboo in their curriculum of UG and PG programs. CGBMT is working on the syllabus and course content development for the institute

Collaborations with other organizations

CGBMT has been collaborating with various types of NGO's to create awareness about bamboo and impart skill training to various sections of the society like Spastic society of India, Parikrama Foundation, Uravu, Sarthak, SEEDS India, SEWA housing etc

- Resource organizations

CGBMT's Sustainability Institute at Bangalore



The Road Ahead

CGBMT is planning a Sustainability Institute on a 5 Acre fully residential campus near the Bangalore International Airport.

It is expected to become operational in the next 2-3 years.

The institute will provide education, research and development on all aspects of sustainability, bamboo being one of the major focus areas.

All the above courses will be run from this campus with the present center catering as its city office.

CGBMT with DEI plan to take the skill development program to all the states in India, Sri Lanka and other countries through DEI's vast network of distance education study centers and strong alumni association working on ISR to spread education to one and all as a panacea to all their problems