

**NATIONAL MISSION ON EDUCATION THROUGH INFORMATION
AND COMMUNICATION TECHNOLOGY**



MISSION DOCUMENT

**NATIONAL MISSION ON EDUCATION THROUGH
INFORMATION & COMMUNICATION TECHNOLOGY [ICT]**

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1 Introduction

For India to emerge as a knowledge super power of the world in the shortest possible time it is imperative to convert our demographic advantage into knowledge powerhouse by nurturing and honing our working population into knowledge or knowledge enabled working population. Human Resource Development would certainly be the key for it to happen. To come to grips with the task ahead, it would be appropriate to have a look at our eco-systems.

1.1 Statistical Indicators: The following statistics would reveal the magnitude of the problem:

- Literacy rates: The overall **literacy rate** in the country, as per the 2001 census, was 64.8 %. This implies that we do not even have the formal means to know about the talents of the remaining 35.2 % of the population, **let alone try to nurture their talents**. This is a very high under utilization of the nation's human resources.
- Growth of educational institutions: Between 2000-01 and 2003-04, the number of Primary Schools has **risen** from 6.38 lacs to 7.12 lacs i.e., a simple rate of growth of 3.87 % p.a.. Similarly, in the same period, the number of Upper Primary Schools has **risen** from 2.06 lacs to 2.62 lacs i.e., a simple rate of growth of 9.06 % p.a.. The **Plus 2 level** institutions during the same period have risen from 1.26 lacs to 1.46 lacs i.e., a simple rate of growth of 5.29 % p.a. . In the same period, the number of Colleges for general education has risen from 7900 to 9400 i.e., a simple rate growth of 6.33 % p.a. With a slow rate of growth in the number of educational institutions, we cannot hope to quickly make a dent on the **base line** educational status of the population. Hence, the conventional approach must also be aided and supported by the technological

interventions through **ICT** so as to make available the knowledge resources to every learner as per his / her convenience and just in time.

- Enrolment of students: The rates of rise in enrolment per annum, between 2000-01 and 2003-04 in Primary, Upper Primary and High / Higher Secondary classes, have been 4.24%, 4.59% and 8.93%, respectively. At this rate, unless alternative routes are opened, it seems very difficult **to bridge the gaps and** achieve full utilization of our human resource potential.
- Gross enrolment ratio: **The gross enrolment ratio for the primary classes has been hovering between 90 to 100% since 1990-91, but even then the literacy rate being only 64.8 %** signifies that a large number of students drop out quite early, without achieving literacy. **A question comes to mind as to how could they get enrolled in the first place if they had to drop out within a year or two or whether our pedagogy is so unattractive as to lose the interest of the young minds.**
- Drop out rates: The drop out rates in 2000-01, 2001-02, 2002-03 and 2003-04 have been 40.7%, 39.0%, 34.9% and 31.5% respectively.

1.2 Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis

1.2.1 **Weaknesses Identified:** Our ambition of India becoming a knowledge super power by effectively utilizing her abundant human resource faces the following weaknesses:

1. Abundance of un-nurtured talent.
2. Lack of timely and easy availability of knowledge resources to all.
3. Opportunities lost because of difficult access to information and guidance.
4. Mismatch between demand and supply of knowledge and skills
5. Lack of collaborative learning
6. Questionable quality of teaching at various places

7. Non-standardized testing
8. The lack of a legal framework that links the qualification and certification framework to the prescribed requirements for the job and a regular performance appraisal of those who prepare the content and of those who deliver and teach it.
9. The growing digital divide
10. A lack of personalized monitoring and long term tracking of growth and enhancement in learning, skill and performance.
11. A very low percentage of digital literacy
12. Lack of encouragement to excel
13. Substantial duplication of efforts at various levels
14. Time mismatch between school hours and employment hours for those learners **who have to simultaneously earn the livelihood for their families.**
15. a lack of access to institutions
16. a lack of access **devices to digitally bypass shortcomings** of Institutions and teachers
17. a lack of multi-layered networks for knowledge absorption and knowledge propagation.
18. The lack of a strong contingent of motivated teachers.
19. Inefficient functioning of the knowledge delivery mechanism.

1.2.2 **Inherent Strengths:** On the other hand, we have the following inherent strengths:

- A large human resources of high intellectual caliber
- A large number of expert faculty in almost every field
- A growing middle class with a high priority for education
- A number of world class institutions of learning & research
- Technological and Communication backbone to take their advantage in the field of knowledge empowerment of the mass of learners

1.2.3 Opportunities on the horizon:

- Falling cost of hardware
- Falling cost of bandwidth
- A high growth in mobile density
- Availability of **EduSAT**
- Availability of infrastructure for narrowcasting using DD (Doordarshan) HPT (High Power Transmitter) & LPT (Low Power Transmitter)
- Rapidly expanding **Optical Fibre Cable** network for terrestrial broadband connectivity.
- The advent of very low power consumption connectivity & computing devices
- The abundance of knowledge on the internet
- Rapidly expanding network of cyber kiosks and cyber cafés
- Knowledge enhancement at any age, any place, any time, any direction.
- Participation of the private sector in providing computer education.

1.2.4 Threats looming large:

1. A growing knowledge divide may soon endanger the fabric of social harmony
2. Other countries, managing their educational infrastructure well, may provide initial lead to their children which **might** get multiplied as the time progresses
3. **If delayed**, other countries may wrest the IT based initiatives from us.

With an ever expanding field of knowledge, the knowledge and skill sets required by an individual **to successfully lead life** has also expanded, **throwing up challenges of learning more and more throughout one's life. Add to that challenges of pedagogy being faced by the teachers to package more and more for the uptake by the students within the same amount of time available.**

2 Need for National Mission on Education through ICT

Fortunately, the ICT as a tool in education is available to us at this juncture and we wish to fully utilize it to enhance the current enrollment rate in Higher Education from 10% at present to 15 % by the end of the 11th Plan period. A budget allocation of Rs. 502 crores has been made in 2008-09 for the National Mission on Education through ICT. It is a momentous opportunity for all the teachers and experts in the country to pool their collective wisdom for the benefit of every Indian learner and, thereby, reducing the digital divide. Under this Mission, **a proper balance between content generation, research in critical areas relating to imparting of education and connectivity for integrating our knowledge with the advancements in other countries is to be attempted. For this, what is needed is a critical mass of experts in every field working in a networked manner with dedication.** Although disjointed efforts have been going on in this area by various institutions / organizations and isolated success stories are also available, a holistic approach is the need of the hour. This Mission seeks to support such initiatives and **build upon the synergies between** various efforts by adopting a holistic approach.

It is obvious that emphasis on ICT is a crying need as it acts as a multiplier for capacity building efforts of educational institutions without compromising the quality.

The Mission is also necessary to sustain a high growth rate of our economy through the capacity building and knowledge empowerment of the people and for promoting new, upcoming multi-disciplinary fields of knowledge.

2.1 Cardinal philosophy of the Mission

There are three guiding philosophies for this effort – [a] no talent of the country should be **allowed to go waste**, [b] all the services available through the content delivery portal *Sakshat*

should be free and [c] freely available material on the web should be used so as to avoid reinventing the wheel.

2.2 Objectives of the Mission

The content portion of this Mission **would have an ambitious vision of catering** to the learning needs of more than 50 crore Indians (working population) and of providing a one stop solution to all the requirements of **the learning community**

In order to bolster our knowledge resources, to obtain and maintain the competitive edge in the world, we require a system of identification **and nurturing of talent and lifelong learning. Knowledge modules based on the personalized needs of the learner would need to be delivered to him /her at the right time with the right content interactively to take care of his / her aspirations.** In due course of time there would be a need to develop and maintain the knowledge and capability profile of every individual learner / worker. Such a system would have to be developed in a cost effective manner over a period of time, integrating, inter-alia the following objectives:

1. Effective utilization of intellectual resources, minimizing wastage of time in scouting for opportunities or desired items of knowledge appropriate to the requirement,
2. Certification of attainments of any kind at any level acquired through formal or non formal means in conventional or non conventional fields,
3. Any-time availability of desired knowledge at appropriate levels of comprehension to all for self paced learning,
4. Platform for sharing of ideas and techniques and pooling of knowledge resources.
5. Systematically building a huge database of the capabilities of every individual human resource over a period of time,

6. Scholarship / Talent management including identification, nurturing and disbursement electronically.
7. Nurturing of scholars and learners.
8. Support to all the learners / workers for any of their perceived learning needs,
9. Extensive **leveraging** of the advancements in the field of ICT for taking the knowledge resources to the door steps of the learner,
10. Capability to handle the user base which would ultimately be expected to cross 50 crore in the long term.
11. Use e-learning as an effort multiplier for providing access, quality and equality in the sphere of providing education to every learner in the country.
12. Provide for Connectivity & access devices, content generation, personalization & mentoring, testing & certification and encouragement of talent.
13. Bringing efforts of different interested agencies working in the field of e-learning under one umbrella and establishing logical linkages between various activities.
14. Capacity building in this sphere and utilizing dormant capacities of various organizations. Creating infrastructural facilities for long term utilization and making sustained efforts for content generation & connectivity including access devices production.
15. Encouraging research in **spheres covered by Mission activities**. Creating a large number of networks of experts in various fields to carry forward the gigantic vision under this Mission.
16. Providing e-books & e-journals, utilizing the repository of contents generated so far and the automation of evaluation processes. Creating a high impact brand for e-Journals in leading disciplines with a provision for good incentive-based payment to the researchers publishing their high quality papers in these e-Journals.

17. Spreading Digital Literacy for teacher empowerment and encouraging teachers to be available on the net to guide the learners.
18. Multi-lingual content development for the learners more comfortable in those languages.
19. Voice support for educational material delivery and interactivity for the content on the portal.
20. Development of interfaces for other cognitive faculties which would also help physically challenged learners. These efforts may cut across all the content generation activities.
21. Conversion of existing educational tapes into indexed formats compliant with the internationally accepted standards such as **SCORM (Sharable Content Object Reference Model)**.
22. Launching a national movement for content and question generation.
23. Development of GIS (Geographical Information System) based resource inventory as a knowledge base (for subjects and skills where ever possible / feasible) for educational and planning purposes.
24. Improving teachers' training and course curriculum.
25. Providing **Digital/Information Literacy** for teacher empowerment.
26. Creating a clearinghouse cum rating agency for various web based learning contents for guiding Indian learners.
27. Establishing a credible rating institution for knowledge content available on the Internet utilizing the large expert base, which would get collaboratively networked through one of the sub Missions of this National Mission.
28. Preparation of metadata and timed index preparation for educational video / audio content on tape or other media.

29. Credit based flexible module formulation for openness to qualifications and easy transfer of credits from one programme / course to another.
30. ERP (Enterprise Resource Package) and e-Governance for education.
31. Development of pedagogical techniques based on edu-entertainment.
32. Customisation of Open Source Tools etc.
33. Development of robust models of networking to encourage community participation at local levels.
34. Content delivery through EduSAT and narrowcasting of TV signals. Providing 1000 DTH (Direct to Home) channels on 40 transponders [to be availed through the Department. of Space] so that a separate DTH channel is available for every subject for every class in various languages to the extent possible.
35. Development of DTH platform for EduSAT and cheaper equipments for two way connectivity through satellites.
36. Providing e-Learning support to every higher education institution for technology assisted learning.
37. Setting up virtual labs and lab centers and finishing schools for quality enhancement.
38. Development of cheap access devices to make them affordable for every individual.
39. Making broadband affordable for every learner.
40. Developing reliable identification systems for learners and examiners and also developing model testing centers to test the learners under controlled environment.
41. Developing very low cost, low power consuming wireless mesh [Institution of Electrical and Electronics Engineering (IEEE) 802.11 standard or better] or point to point long range communication [IEEE 802.16 standard or better] capable

robust video servers to act as communication and computational hubs at educational institutions.

42. Development of devices for achieving convergence among connectivity technologies.
43. Standardisation & Quality Assurance of e-Content.
44. Facilitating development and deployment of ultra low cost physical tool kits for engineering and science students to encourage project and design based learning complementary to the e-learning.
45. Deriving lessons from our ancient knowledge base.
46. Reducing ill-effects of internet / web based learning.
47. Guidance to learners through various psychological / personality tests.
48. Coordination and synergisation of knowledge related activities of different Ministries and organizations.

The objectives of the National Mission on Education through ICT shall include (a) the development of knowledge modules having the right content to take care of the aspirations and to address to the personalized needs of the learners; (b) research in the field of pedagogy for development of efficient learning modules for disparate groups of learners; (c) standardization and quality assurance of contents to make them world class; (d) building connectivity and knowledge network among and within institutions of higher learning in the country with a view of achieving critical mass of researchers in any given field; (e) availability of e-knowledge contents, free of cost to Indians; (f) spreading digital literacy for teacher empowerment (g) experimentation and field trial in the area of performance optimization of low cost access/devices for use of ICT in education; (h) providing support for the creation of virtual technological universities; (i) identification and nurturing of talent; (j) certification of competencies of the human resources acquired either through formal or non-formal means and

the evolution of a legal framework for it; and (k) developing and maintaining the database with the profiles of our human resources.

The Mission would also endeavour to blend soft skills with knowledge modules and inculcate a discipline of holistic thinking in the learners so as to make them job creators rather than job seekers.

2.3 Scope of work for the Mission:

1. The proposed Mission shall work for scaling up of the existing Education Help line - 'One Stop Education Portal'- "SAKSHAT". The helpline shall take care of all the needs of the entire learning community including the students enrolled in various educational institutions and lifelong learners by extensively utilizing e-learning concepts and the ICT based methodology. "SAKSHAT" shall be fully equipped with intelligent navigation techniques for easy and smooth browsing. The education portal shall integrate the scholarship programme of the Ministry of Human Resource Development and ensure disbursement of Scholarship electronically. In order to achieve its objective, the proposed Mission shall encourage development of high quality e-content, for loading on to 'SAKSHAT' in all disciplines and subjects, at various levels using the best available authoring tools and making fullest use of animation and multimedia technologies in order to make learning interesting and facilitate clarity of concepts to the learners.
2. Continuing with the philosophy adopted for the construction of SAKSHAT, the Mission shall encourage support and welcome every intellectual and agency, whether Non-governmental or Governmental, to contribute for the growth and development of the portal by way of development of e-content and the uploading of it on to the portal or by contributing to the existing features or by adding new features to the portal. The Mission shall devise a mechanism to evaluate the contents developed by the above said intellectual or agency, before placing them on the portal, in order to ensure the

authenticity, correctness and the quality of the contents. Since, running the portal is a continuous, on-going, mammoth task, the Mission may entrust the responsibility for development, maintaining and co-ordination of the portal related activities to a governmental body identified by it. Such a governmental body shall work under the guidance and supervision of the Mission, which shall also provide financial and technical support to this designated agency for development, maintenance and up-keep of the portal.

3. With the objective to make use of already generated high quality e-content available on tapes, the Mission shall support the exercise of the digitization of such tapes and their indexing for the convenience of users. The Mission shall also encourage the teachers and intellectuals across the country to contribute to the national wealth of e-content in their respective areas. For this purpose, they shall be provided with technical and financial support. There is also a plan to develop a GIS (Geographical Information System) based inventory of the above mentioned national resources of e-content for the benefit of the users. This inventory shall be in accordance with the various subjects and the disciplines.
4. The Mission would also undertake the exercise, with the help of experts to evaluate the knowledge e-content available on the web and those generated within the country so that a credible rating is available to the learners. The efforts shall also be made for the incorporation of suitable index in the metadata and time-index for educational content available on video or audiotapes or on other media so that an easy access to the content of interest becomes possible.
5. The Mission would also undertake Quality assurance of e-learning content and evolve standards required for content creation, delivery and management. It would also carry out R&D (Research and Development) in specific important areas of content creation

and management for enriching quality process. It would promote multi-institutional involvement for **research activities** and dissemination of quality awareness.

6. Setting up of virtual laboratories, lab centers and finishing schools would be encouraged and facilitated by the Mission, so that the learners in the distance education system and those in remotely located educationally backward areas can reap the benefit of quality and relevant education, through ICT. These laboratories shall provide a platform for the students to conduct experiments in a virtual environment and enhance their capabilities.
7. The Mission would work and extend support for building the knowledge network among the institutions of higher education and seamlessly integrate with the integrated National Knowledge Network in the country in order to ensure free availability of the above mentioned knowledge – e-content to all users / learners through out the country using all possible channels such as internet, intranet, EduSAT or narrow casting TV signals, Direct to Home (DTH) platform. To ensure access of the knowledge e-material to students, the Mission shall work for providing access devices (computers) and broadband connectivity to all educational institutions of higher learning. The ultimate goal is to make broadband connectivity available to each citizen free of cost for educational purpose.
8. In order to empower the teachers and learners, at a disadvantage on account of lack of digital literacy, the Mission, would help Governmental and Non-Governmental agencies launch a mass movement to spread digital literacy for teacher empowerment so that they can use the computer and access e-devices, which are necessary to browse through e-content and the world of knowledge available in cyber space and spread education among the masses.

9. In order to take the benefits of ICT enabled learning to the masses, the Mission would encourage and support research for achieving technological breakthrough and innovations for development of very low cost and low power consuming access devices, authoring tools for contents, development of software, navigation tools, and new technologies for creation of virtual laboratories and other electronic means for facilitation of e-mode of distance education. The research areas would also include IPTV(Internet Protocol Television), edu-entertainment, technology for education, life long learning environment, digital library for e-books & e-journals and evaluation & examination systems etc.
10. The Mission shall facilitate and support setting-up of a testing service for certifying the skills acquired by the learners either through formal or non-formal means. The Mission shall devise a reliable system for identification of learners / examinees and examiners. It shall have testing centers for testing of the skills /competence/ capabilities of examinees under a controlled environment. There shall be a system of ongoing development and enriching of the question banks, with the involvement of experts and teachers from all over the country.
11. The Mission shall also facilitate sharing of high cost resources (software as well as hardware) available at various institutions with a view to improving their capacity utilization.
12. **CONNECTIVITY RELATED SCOPE OF WORK:** In order to provide unfettered access to existing educational institutions, they all should be connected through MPLS VPN (multi protocol label switching - virtual private network). In this VPN, hundred premier institutes and universities should be connected via 1 Gbps access links (equivalent to 2000 number of 512 kbps VPN endpoint). All other 18000 educational institutions and colleges should be connected through 10 Mbps access links (equivalent to 20 number of 512 kbps VPN endpoints). These access links will also provide

internet access to the participating institutes. Also, 10 free DTH TV channels will be setup for continuous broadcast of educational video content generated in the past and during this Mission. Also, multicast based IPTV streaming of video content shall be made through Edusat. For this purpose, SITs (Satellite Interactive Terminals) will be placed at all the institutes. In order to enable the uplinking of the IPTV content to satellite, there will be six uplinking hubs to six national beam transponders. In order to make the effective utilization of all the above infrastructure, PCs need to be made available at all the institutes. There will be upto 18,00,000 PCs provisioned with 50:50 cost sharing basis at all these institutes. As the uplinking hubs and SITs for Edusat will be operational fully by the end of three years, one will use Ipstar type of satellite to begin with. The Ipstar will be discontinued with full Edusat infrastructure in place with 45Gbps capacity. The terrestrial connectivity would be obtained on a rental model from the Department of Telecommunications so as to ensure seamless integration as and when iNKN expands and covers all the Higher Education Institutions.

3 Various components of the Mission

The components of this Mission would include:

3.1 The Sakshat Portal

The efforts of Ministry of Human Resource Development (MHRD) would be geared towards creating an open house for knowledge. The approach would be to scrupulously avoid re-inventing the wheel. What would be attempted is harnessing a large number of knowledge resources in a manner that adds value to them by making them more personalized and useful to the lifelong learner / student. The effort would also involve content packaging and integration to suit specific needs of the students at various levels or with different kinds of talent / mental prowess.

The portal would boldly seek to address many of the shortcomings in our education system by bringing together the best experts in the country in their respective fields and best available knowledge resources on the web in the public domain. It would seek to standardize the curriculum and learning materials across the country and keep them in tune with the latest trends world over so that Indian learners do not lag behind. Teacher- independent modules could work wonders in remote areas where the learner does not have access to good quality teachers or wants to study independently. Such a system could also enable a lot of community learning and formation of groups of learners of a given caliber from diverse fields to enable fusion of best practices of one field of knowledge with those of the other. It may also galvanize rural communities who may share their problems with each other and find solutions from the locally available knowledge and talent. In case, solutions to problems being faced by a community are not forthcoming within a geographic locale, the horizon could be expanded as the internet enables us to expand the boundaries to include even the entire world. Many educational services like scholarships, testing and certification, student / scholar / teacher / institution ratings, guiding demand and supply of talent through opportunity surveys and forecasting etc. are also expected to be delivered through this portal.

3.1.1 Approach to Solution:

Reinventing the wheel is to be scrupulously avoided if a system of this magnitude is to be put in place. The approach should be to get what ever has already been developed – by entering into MOUs (Memorandum of Understanding) with the concerned IPR (Intellectual Property Rights) holders, and then to further build the system, to add value for achieving the desired goals. It will also be necessary to design the portal in such a way that it sustains the interest of the learner and at the end of every web session, the learner logs out with the satisfaction of having added to his/her knowledge in a way that he / she wanted.

3.1.2 Existing Resources:

Fortunately, in this area, so much work has already been done that it should be possible to collect those fragments and build the system very fast. Almost all the Institutions of repute have hosted their web sites – many of them have been quite informative and interactive too. A large number of software companies have also floated their products in the field of knowledge for testing and certification. Many sites catering to the requirements of the school students have also sprung up. Large ICT sector companies have their knowledge banks and evaluation systems which cater to the needs of the student community. Harnessing them through competitive procurement and integrating them into the overall concept of this portal can provide a spring board for accelerated development of this system. Seeking collaboration with various research labs and utilizing the available infrastructure in the country should also be tried. Work being done in this area by various Indian Institutes of Technology (IITs) and other technical institutions should also be integrated, seamlessly, to achieve synergy. It is with this aim in mind that some of the IITs, multinational IT companies and the Ministry of Information Technology have been involved in the process of consultation. The National Project on Technology Enhanced Learning (NPTEL) is nearing completion and it would be generating a vast pool of learning modules for various branches of Engineering / Technology. These resources would also be delivered through this portal.

3.1.3 Team building & Institutional support requirement:

This being a truly multi disciplinary effort, its success will entirely depend on good teams in technological and knowledge content areas. For the technological part, NIC and its various collaborators will have to come forward as a strong and committed team whereas for the knowledge content part, various institutions under the Ministry of Human Resource Development (MHRD) will have to rise to the occasion. So far, institutions like Central Board of Secondary Education (CBSE), Kendriya Vidyalaya Sangathan (KVS), Navodaya Vidyalaya Samiti (NVS), National Institute of Open Schooling (NIOS), Indira Gandhi National Open University (IGNOU), All India Council for Technical Education (AICTE) and National

Council of Educational Research and Training (NCERT) have been actively participating. In an endeavour of this magnitude, a directive will have to be issued to all the Institutions of repute to collaborate whole heartedly in this effort.

Team building would also include start ups, small scale companies, research organizations and individuals who have the capacity and capability to contribute to the goals of the Mission. The objectives would include development, refinement, and distribution of knowledge products through portals. Individuals, start ups and small companies would need to enter into a partnership with educational institutions for the proper monitoring and testing of the products developed. Private educational institutions may participate in the given project of the Mission for specific deliverables. If required, international participation can also be sought, in emerging areas or on the basis of need, so that the best education can be imparted.

Especially for VTU (Virtual Technological University) international faculty engagement may be required to acquire specialty, e.g. the course on railway technology may need cooperation with France. This would not only enhance quality standards but also promote international acceptability of such new attempts.

There would be a team in place so that support for hardware, connectivity and software can be provided on the continuous basis.

3.1.4 Community Participation

With the avenues of interaction between the haves and have-nots of knowledge in the community, many problems will get solved by the community members themselves, also enriching the knowledge database of the portal. A silent digital revolution aimed at the upliftment of our rural masses is expected to ensue. With such bright prospects the contribution made to the pool of knowledge by the individuals will not go un-rewarded.

3.1.5 Human Resource Database

By ensuring a system of continuous updating of profiles of learners, teachers, institutions, test questions and the knowledge modules, this portal is expected to bring about a qualitative change in the paradigm of learning and talent nurturing. It will also emerge as a massive database facilitating matching of talent with their requirement elsewhere, providing the opportunity for placing the right talent at the right place at the right time for the right job.

The Mission shall evolve and establish a mechanism for the creation, development and maintenance of a data-base of human resources, having details of the trained manpower in different skills and professions in the country. Mechanisms would also be devised to know the projected requirements of manpower in different trades and disciplines on the basis of economic growth in various sectors. Such a data-base shall help the prospective policy makers in formulating the policy for the development of human resources and for assessing the training needs in different fields, as per the requirement according to the direction of the economic growth of the country.

3.1.6 Finishing Touches to Quality

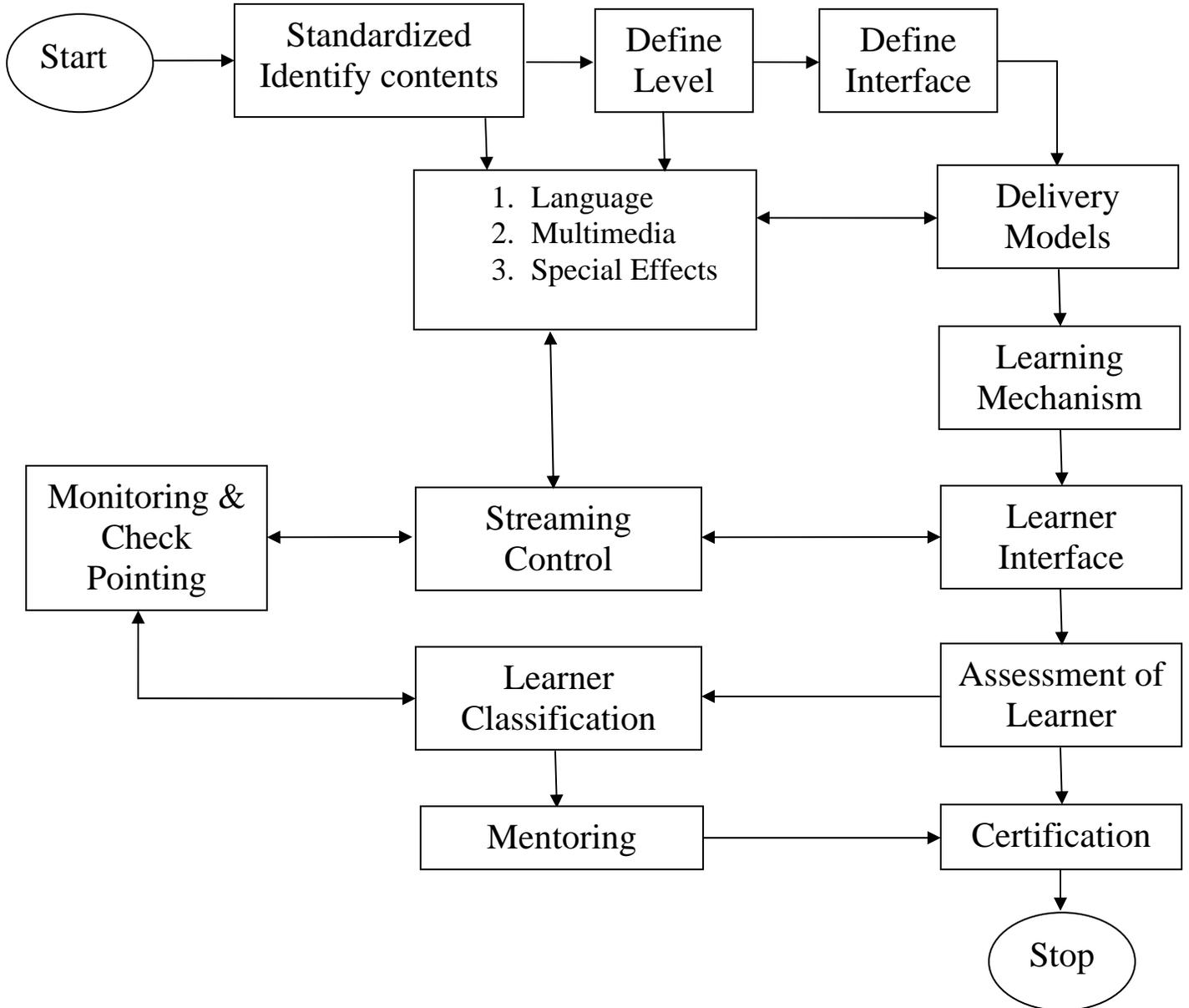
Over a period of time, as the portal evolves, it would also act as an enhancement tool for the value and quality of the education of students who could not get admission into the country's highest institutions of learning.

3.2 Spreading Digital Literacy for teacher empowerment & bridging the Digital Divide in teaching learning community in Higher Education

For bridging the digital divide and empowering teachers /learners to harness information and communication technologies for their empowerment through knowledge, the need of the hour is to provide digital literacy to teaching learning community in Higher Education. The aim has to be that this community should be able to operate the computer or other devices and connect to the knowledge network.. It should be for teacher / learner to identify the content

from its suitable pictorial representation and to play the audio-visual content to derive knowledge from the relevant module of knowledge. Obviously, this digital literacy cannot be spread through the computer networks since it aims to empower the teacher / learner to use the network. Hence, digital literacy for teacher empowerment will have to be imparted through other means relying heavily on audio-visual material, non-governmental organizations, change agents and institutions established for them, and mass contact programmes. Basic flow chart for steps for development for digital literacy is given below:

FLOWCHART FOR TEACHER EMPOWERMENT THROUGH DIGITAL LITERACY



The flow of knowledge has been clearly indicated in the flow chart. It is evident that mentoring and monitoring play a key role for the project's success. Since knowledge has different levels of learning, therefore, an assessment of the learner is important to shorten the learning curve of the learner. The level of the knowledge acquired shall become a basis and an input for the certification program. The certification process through proper testing, preferably e-testing, shall examine and assess the level of proficiency of the learner.

Once a teacher / learner becomes digitally literate and understands the benefits that he could reap from the network, there would be a need for computing and connecting devices, as well as communication networks, for providing connectivity to the world of knowledge.

This requirement stems from the shortcomings of the current educational delivery model and the explosive nature of the knowledge. Schools, Colleges and Universities have not been able to keep up with the requirements for educating the Indian masses at the rate, level and quality that is expected from an Indian citizen in the coming knowledge era. To bridge this gap, new models of content creation, content delivery, learning, management and planning mechanisms for creating cooperative and self-learning environment have to be developed. The content, reportedly available in English, for different levels of various courses needs to be translated into vernacular languages. There is also the need to modulate the translated versions to accommodate the learning abilities of the target individuals in the e-learning domain. This will mean that the content and its orientation to improve, grasp and enhance learning will have to be ensured through:

- a) Interactive and personalized content mechanism,
- b) Multi dimensional content generation,
- c) Learning evaluation and assessment techniques,
- d) Supplementing of multi dimension contents with multimedia and other delivery methods and for various end point devices.

This middleware that shall evolve will impart learning in conjunction with standardized available content that is formulated at a level of abstraction, so as to address the generic nature of learning and keep in mind the individual's capacity, capability and aptitude.

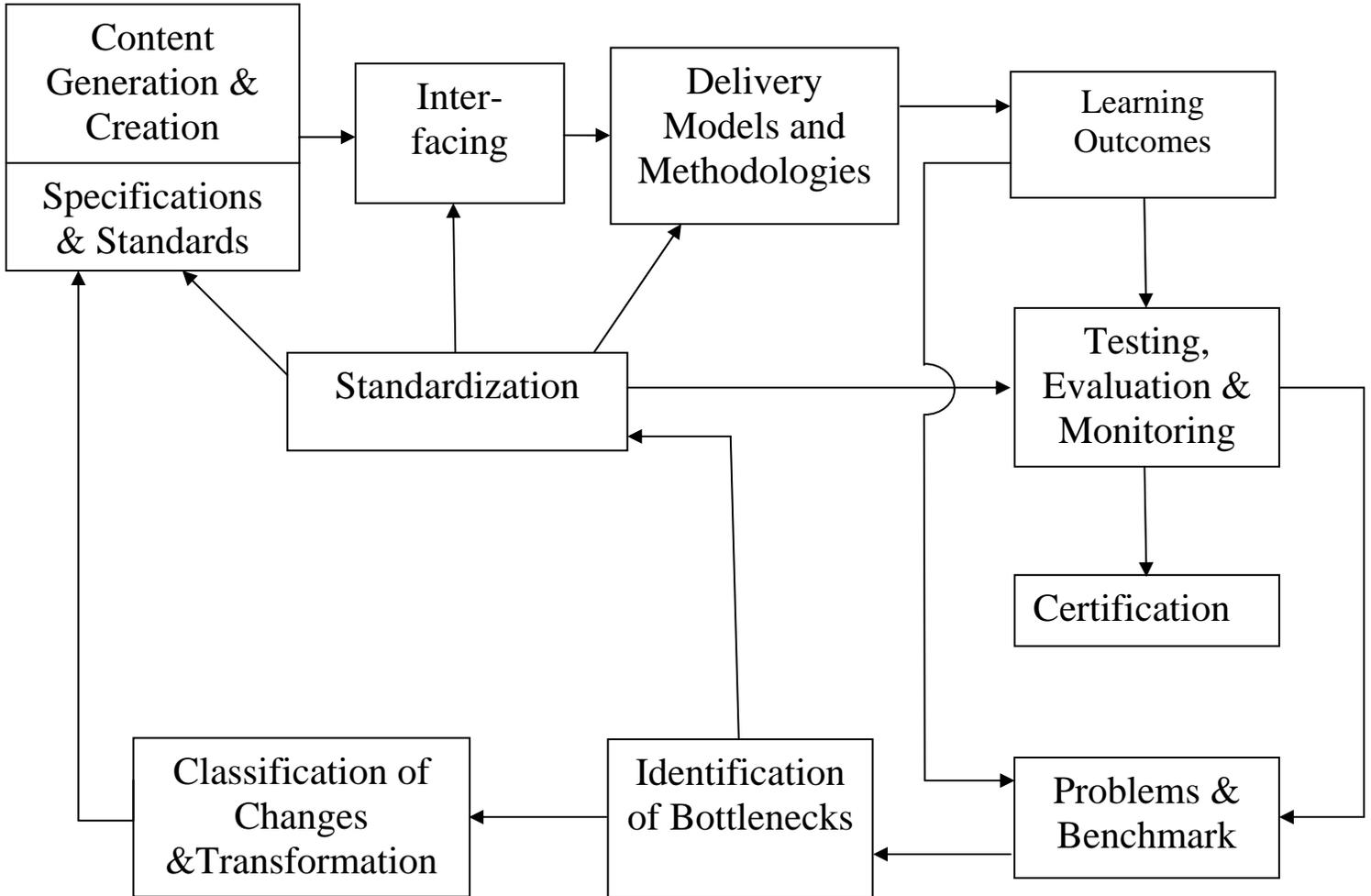
3.2.1 Objectives

1.
 - (a) Identify the issues related to Digital Literacy
 - (b) Identify Delivery Models with reference to Learner-Centric Goals
 - (c) Establishment of a Data Centre for Learning Technology Assessment
 - (d) Creating Coherence in Collective Efforts of participating agencies
 - (e) Partitioning of expertise based tasks among the participants for accelerated goal achievement

2. Hierarchical Levels of knowledge empowerment through Digital Techniques.

3. Using generic content and creating methodology for any target, any audience and incorporating evaluation and assessment based alternative for multi learning modes with multimedia support.

The summary of the methodology to be adopted is briefed in the following diagram.



3.2.2 Support to Non-Governmental Organizations (NGOs) and Governmental Organizations for teacher empowerment through digital literacy

The Mission shall provide financial, technical and logistic support to the Governmental and Non-Governmental Organizations engaged or intending to be engaged in the task of teacher empowerment . It shall be open to the NGOs and Governmental Organizations to devise their own strategy for educating the teachers about the use of computer and access devices in order to empower themselves for making the best use of ICT to meet their educational and training needs. The formulation of new strategies for the teaching-learning community is essential because the people in different conditions and states of mind may require them for developing the competence for using the e-devices and using ICT for learning.

3.3 Provision of e-books and e-journals free to the learners

Overall education can be divided in two parts i.e. formal education and informal education. Both forms of education require text books, reading material, journals and magazines. Access to different forms of learning material can be provided through digital libraries which would substitute comprehensive brick-and-mortar libraries. Since everything in the library would be available online with concurrent access to multiple sites for a large number of students, good bandwidth around the year would be the key.

In the present times, for most of the students and learners, the library culture has gone missing either because of inadequate library facilities or because of a paucity of time with the students or due to the procedural hassles and availability of fewer copies of books to be issued or non issuance of reference books. What ever be the reason, the readership has certainly gone down today. This has deprived our students and learners in various ways. The problem is further compounded for those who do not have access to good libraries for any reason. A much more efficient way in terms of time and effort would be to make the digital libraries available on the net. These digital libraries could remain up-to-date and have much wider reach. If premium e-books and e-journals are made available over the net through ‘Sakshat’, it would serve the students and learners in a highly cost and time efficient manner. Such an arrangement will

empower the students to access the concepts on a given topic across a large number of world class reference books and journals at the click of the mouse. The enhanced accessibility could be used in conjunction with the knowledge modules developed by experts and made available on 'Sakshat'. It would be possible for the students / learners to get the material relevant to their desired level of understanding and requirement using the metadata for the available material graded suitably by the group of experts in the country working on-line.

The need having been established, the problem is of having a good business model to achieve this, so as to get the best books with their latest editions and most recent journals of repute including the back volumes and archives. One such model is Information & Library Network Centre [INFLIBNET] and All India Council for Technical Education – Indian National Digital Library in Engineering Sciences & Technology [AICTE- INDEST] consortium model which is working well for the e-journals. National licencing model or pay per use kind of model along with concessions available under the fair use clause of the Copyright Acts would need to be developed. The present level of payment to International publishers and aggregators of e-journal databases through INFLIBNET / INDEST and other participating institutions is in the vicinity of Rs. 100 crores per annum. Effort would be made to include renowned books of high quality reference value into this kind of arrangement so that learners in the country have easy access to relevant books in any subject, at any time they like. Availability of good quality e-books would also reduce our efforts in re-writing the books. The time thus saved would free the experts to devote more time to value addition to the content and enhancing the pedagogic efficiency of the final knowledge modules on Sakshat.

The Mission shall evolve a permanent mechanism to enter into dialogue with reputed publishers of textbooks, reference books, research journals, learning material and software that may be used for educational and training purpose etc. to ensure availability of high quality reading material, reference material, research papers as well as needed educational software for use of Indian learners, free of cost, in digitized form through above said One-Stop Education Portal. This mechanism may involve setting up of a Standing Committee of the

Mission to negotiate on the prices and terms and conditions and making recommendations to the Mission.

3.4 Support for Generation of e-content and digitization and indexing of existing e-content

It shall be the endeavor of the Mission to continuously work for enriching the repository of e-contents of the nation. For the purpose it shall encourage the academicians, scholars and institutions to contribute to the world of knowledge in cyber space by creating e-knowledge content. The Mission shall also evolve a mechanism to rate the quality of the e-content generated before admitting it to the national repository. As a custodian of the national repository of e-content, the Mission shall undertake an exercise for indexing the available e-content, for its easier retrieval and access by the learners.

The Mission shall work on the philosophy of encouraging all the scholars and academicians to generate e-content. This may even result in generation of more than one set of e-content on one topic in any given discipline. This philosophy has been adopted because of pedagogical considerations and the fact that different kinds of learners have different learning aptitude, therefore, one kind of e-content can be appreciated in a better way by one set of learners and the other kind of e-content by other sets of learners.

3.5 Video Content Indexing & Chunking

15000 beta tapes of various video lectures are available with the University Grants Commission- Consortium for Educational Communication [UGC-CEC], a similar number of tapes are with Indira Gandhi National Open University (IGNOU). Central Institute of Educational Technology (CIET) and State Institutes of Educational Technology (SIETs) have also produced similarly voluminous video lectures and so has National Institute of Open Schooling [NIOS]. Thus, we may assume, at least, 60,000 hours of video content availability

which has neither been indexed nor chunked. Their digitization also needs to be done so as to make them web enabled.

Automatic indexing and chunking not being possible, it might have to be done manually in real time where the media expert and the subject matter expert would have to sit together in a lab facility and go through the tapes one by one.

It is also important to develop indexing tools in house to meet the requirement of various languages in the country .The access to metadata and data mining should be provided to save time wasted while looking for correct and focused contents. This also provides user friendliness. In the present scenario, a lot of research is required in the field of audio and video indexing where as the text tools are easily available, at least in English. Ultimately, the indexing tools would be integrated in contents so that the authors can also use these tools for proper organization of content.

3.6 Evaluation of e-content

Benchmarking learning content would ensure quality which is central to the philosophy of the Mission. As content generation shall take place at various places, by different sets of experts, the development of quality assurance procedures and testing mechanisms is essential. These tools shall be deployed on the Mission website so that any body developing content can routinely use these to get proper feedback.

A large quantity of e-learning material, in digital form, is already available. Therefore, the Mission shall undertake an exercise to evaluate the already available e-learning material, as well as the one which is being or is to be generated, and grade them for the benefit of learners. The Mission shall also attempt to provide guidance to them in order to facilitate their search for quality material.

3.7 Financial Assistance to Institutions of Higher Learning for Procurement of Hardware / Replacement of Obsolete Hardware

In order to accomplish its major objective of utilizing latest technologies to make higher education easily accessible, the Mission shall provide financial assistance to all the institutions of higher learning for the procurement of hardware or replacement of the obsolete hardware essential for accessing to the world of knowledge in cyber space. Institutions of higher education shall be encouraged to have, at least, the same number of computers as the number of the faculty members with them. Half of the number of the computers shall have to be arranged by the institutions by themselves, through their own resources or through grants from other sources whereas the remaining 50% may be purchased out of the financial grant provided by the Mission directly or through any other designated Government agency.

In order to maximize efficiency and effectiveness of the video recordings of the content, e-class room infrastructure will be provided on case to case basis. It is envisaged that, at least, 10-15 e-class rooms be created in each region so that quality video lectures may be delivered online as well as through streaming servers. Therefore, the hardware required for a total of 50-75 e-classrooms will be acquired.

3.8 Financial Assistance to Research Projects

Since ICT is fast growing area of technology and new research and innovations are changing the complexion very rapidly, the Mission shall encourage individuals as well as institutions to undertake research projects for the development of new technologies and innovations. Such technologies can support the Mission's goals and help in achieving its objectives. These research projects may include:

1. Development of low-cost access devices
2. Development of authoring tool for e-content
3. Development of new technologies for enhanced use of ICT in education

4. Development of ERP system for institutions of higher learning
5. Development of Edu-entertainment and gaming for knowledge enhancement
6. Development on-demand examination system
7. Development of tools for maximization of Bandwidth usage
8. Development of hardware technologies like routers and switches

This is an illustrative list and cannot be treated as a final. New areas may emerge with the passage of time and the Mission shall consider providing financial assistance for undertaking research in the areas of interest on case to case basis.

3.9 National Testing Service

The Mission shall provide financial and technical support to a designated Government agency for establishment of a National Testing Service (NTS). The Mission shall be free to move for the establishment of a separate body to act as a National Testing Service in order to fulfill its objective to certify the competence and skills acquired by the individual through formal or non-formal means of education and/or training in different disciplines/professions. This shall help them in gaining employment as also to continue their higher studies/training

3.10 CONTENT GENERATION

The indicative requirement of work / goals / deliverables could be as follows:

3.10.1 NPTEL (National Programme in Technology Enhanced Learning) phase II / III

3.10.1.1 Partner Institutions: Seven IITs and IISc Bangalore and other competent faculty and institutions.

3.10.1.2 The Number of faculty likely to participate: 500 or more.

3.10.1.3 Beneficiaries: All Engineering and physical sciences undergraduates/postgraduates in the country; all teachers /faculties in science and engineering Universities in India.

3.10.1.4 Project goal:

To build on the programme launched previously in NPTEL Phase I by the Ministry for Human Resource Development, Government of India on September 03, 2006 and create online course content and interactions between faculty members in science and engineering using the best academicians in India.

3.10.1.5 Project Deliverables:

1. Conversion of NPTEL phase I video courses, in streaming video lecture format and setting up a distributed national video server for delivering lectures on demand.
2. Creation of 1 500 additional web and video courses in all major branches of engineering, physical sciences at the undergraduate and postgraduate levels and in the management courses at the postgraduate level.
3. Integration of College curricula in engineering education with NPTEL content through a large number of course specific workshops and interaction with Colleges in India for improving TEL (Technology Enhanced Learning) infrastructure.
4. Creation of discussion forum for each course created under the NPTEL using a grid of computer servers and setting up FAQ's for each course.
5. Indexing of all video and web courses and setting up powerful search engines to enable content and keyword search on all topics in science and engineering developed under NPTEL.
6. Major outcome of a project of this dimension would be formation of teams, groups, and institutes that would continue to contribute to the knowledge economy of our education system
7. Interconnectivity among the universities and colleges will not only facilitate exchange of courses, seminar, conferences and specialized lectures by national and international experts but also enable resource sharing
8. Knowledge available around the country and internationally would be available as usable packages

9. Enabling tools and technology development for e-learning
10. Virtual Institute/university would be a reality at the end of the Mission
11. Trained manpower in the emerging areas
12. Single window for primary to post-graduate education
13. Business model for a successful Institute- Industry partnership for education

3.10.2 Content for Post Graduate Classes:

There are a number of specializations for the Masters programs offered in the university system. However, very few universities offer state of art and relevant courses. Hence, it is important to develop courses which would add value to individuals and assist them in getting integrated knowledge and in expanding their horizons. For this purpose we need courses like project management, case studies, policy level debates, and economics for non-art students etc.

Post-graduation forms the base for research; therefore, courses like research methodology, data handling and management, technical paper writing and presentation skills, research processes should also find place in the content creation.

PG courses in science, language, psychology and computing would need strong laboratory support and, therefore, the development of virtual laboratories shall be a necessary activity.

The following rough calculation would provide a general idea of the quantum of work and the funding requirements that could be anticipated:

There would be a 100 disciplines to begin with. As knowledge expands, many more disciplines may get added. We have 2 year programme for PG in each of these disciplines.

For every discipline, 8 papers per year equivalent to $2*8*2 = 32$ Courses (Semester level)

NPTEL approved norm is Rs. 7 lacs per Course (Semester Level)

Hence, per Subject cost of content creation = $32*7$ lacs = Rs. 2.24 crores

For 100 Disciplines, $100*2.24$ crores = Rs. 224 crores.

During the 11th Plan if only 50 disciplines are attempted, the cost would be Rs. 112 crores.

3.10.3 Content for Undergraduate Courses:

The course contents .tutorials and virtual labs would be created to support bachelor's degree in science, art, commerce and special topics like music around the world, Indian culture, Indian Heritage, soft skills and physical education. These would complement and supplement university education.

There is a possibility to develop interactive courses for zoology, geography etc, to enable multi-media enabled walk-through programs of various monuments to demonstrate the transitions of Indian history.

A selection of the courses which are of great importance for competitive examination like the IAS qualifying exam is important, such courses are selected by a large section of students and would also form the core of content creation.

Courses like computational math which are rarely offered in the university system shall also be considered for content creation.

The following rough calculation would provide a general idea of quantum of work and funding requirements that could be anticipated:

Say there are 80 different Subjects for UG Classes.

Each Subject has 12 papers in an annual format equivalent to $12 \times 2 = 24$ Courses in a Semester System.

The explanations in this case would have to be more as these are the formative years of higher education. Hence, assuming the NPTEL standard of Rs. 7 lacs per semester course, for 1 Subject, $24 \times 7 =$ Rs. 168 lacs would be required.

For 80 Subjects, the requirement would be 80×1.68 crores = Rs. 134.40 crores.

It is proposed to spend Rs. 35 crores during the first year covering nearly 20 subjects and the e-content generation for the rest of the subjects would be spread over the other 4 years of the 11th Plan. In case a number of subjects still remain uncovered, then they could spill over to the 12th Plan period.

3.11 Standardization and quality assurance of contents & certification / automation of certification

3.11.1 Objectives of Standardisation and Quality Assurance

- To evolve Quality Assurance (QA) Process for E-learning Content.
- To create an environment for Quality Audit of Content.
- To evolve standards for Content creation, delivery and management.
- To carry out R&D in specific important areas of content creation and management for enriching the QA process.
- To promote multi-institutional involvement for definition of quality and dissemination of Quality awareness.

3.11.2 Outcomes expected

- Establishment of Three National Resource Centres on Standardization and Quality Assurance for E-learning Content [NRC (Std & QA)] for three sectors of education such as (a) non formal, school and High School sector; (b) College & University Education Sector; and (c) Engineering & Technology Education Sector.
- Development of Quality Assurance Manual for different categories of users.
- Development of a E-Content QA Portal

- Development of required specification.
 - Development of portal.
 - Integration with Sakshat & NPTEL
- Development of process for Collaborative Content Creation and QA.
- Manpower Training for different categories of E-content developers and experts.
- Organise Seminars, Workshops for QA.
- Development of Templates for cost effective, educationally rich, quality E-Content.
- Creation of Resource person database (subject expert, QA expert and Education Technology expert).
- Development of Standards for
 - Life Cycle standardization & Role definition.
 - Content delivery mechanism.
 - Content Structure.
 - Video & Audio Compression.
 - Video & Audio Streaming.
 - Content in Regional Language.
 - Tools for development of content.
 - Learning Management System.
 - Reformatting of content.
- Development of methodology for managing Intellectual Property Rights (IPRs) issues
- Networking with International Institutions carrying out research in the area of Quality Assurance for E-learning content.
- R & D in
 - Evolution of templates for content creation.
 - Techniques for automatic indexing of audio & video object.
 - Development of Multimedia Database with low level as well as high-level feature extraction.
 - Multilingual Content development.
 - Content in Regional Language.
 - Intelligent navigation technique.
 - Identification of Quality attributes in E-learning.

- Process for content QA and Quality audit IPR Audit and management.
- Automation of Examination / Certification.

3.12 Developing Suitable Pedagogical Methods for Various Classes and intellectual calibers and research in e-learning

Web enabled learning modules suffer from absence of teacher and peer interaction/pressure. Many a times, the content developers develop the modules keeping in mind their own clientele of students or their own impressions of the students' caliber, receptivity, etc. This may result in a "one shoe fit all" syndrome. It is well known that any given class would have very bright students, mediocre students and weak students. Even among them, the grasping power of concepts would vary based on their surroundings and the perceptions that the students have derived over a period of time. The most efficient pedagogical method would also depend on the extent of knowledge that the student has in that area. Thus, it presents a continuum of challenge to develop content that is pedagogically the most suitable for any given learner.

We all know that learning by a postgraduate student is entirely different from learning by a nursery student. Thus, it is imperative that increased research is made in this area to derive new pedagogic techniques for enhancing the effectiveness of the content being developed.

Simultaneously, we would also have to keep in mind the content delivery style for enhancing the attractiveness of the content, as well as its retention by the students. It would imply that the same topic may have different ways of presentation, for students at different intellectual levels and a suitable mix of presenting them in an appropriate manner akin to those suggested by proponents of adaptive learning.

A major problem that the students face is the lack of guidance in the projects that form a part of College curricula. Web based advising systems, capable of bringing in mentors and students together, possibly from different parts of the Country, are a solution, which would have to be attempted.

3.13 Development of language converter tool kit

The focus of the National Mission on Education through ICT would be on content for all classes starting from nursery level to research level. It is well known that even up to graduation level, in some subjects the medium of instruction is the regional language spoken in that state. Presently, the content being developed for Sakshat under this Mission is in English. English content also makes it possible for us to tap into the convenient, open access educational resources available on the internet, be they in text, audio, visual, simulation, animation, question answer or in any other form. This abundant resource, however, cannot be tapped in regional languages because of IPR restrictions. Hence, we would not only need to convert knowledge modules developed by us into various regional languages but would also need to, subsequently, launch a movement for creating the above types of content in the regional languages *de-novo*. This might imply a huge repetition of efforts and the requirements of time and money. A better way could be to mount research to develop language converter tool kits so as to convert the content developed by us in one language into other languages.

3.14 Development and realization of Virtual Reality Laboratories and supporting facilities for e-learning

3.14.1 Objectives

1. To crystallize the concept of a Virtual Lab, which will essentially comprise of a user-friendly graphical front-end, working in synchronization with a backend, possibly consisting of a simulation-engine running on a server or actual measurement data or a real experiment.

2. To identify the suitable topics, where Virtual Labs will provide maximum benefit to the students using them.
3. To develop these Virtual Labs so that they work in a complementary fashion to NPTEL in the sense that they teach the student the basic concepts, as well as trigger their imagination and inquisitiveness.

3.14.2 Observations

1. Virtual Labs will be effective as an instructional tool as well as a self-learning tool. However, Virtual Labs can never truly replace an actual laboratory or the '*touch and feel*' of actual lab experiments.
2. Virtual Labs will provide to the students the result of an experiment by one of the following methods (or possibly a combination):
 - (i) Modeling the physical phenomenon by a set of equations and carrying out simulations to yield the result of the particular experiment. This can, at-best, provide an approximate version of the 'real-world' experiment.
 - (ii) Providing a corresponding measurement data for the Virtual Lab experiment based previously carried out measurements on an actual system. This will be closer to the 'real-world' experiment.
 - (iii) Remotely triggering an experiment in an actual lab and providing the student the result of the experiment through the computer interface. This would entail carrying out the actual lab experiment remotely.

3. Virtual Labs can be made more effective and realistic by providing additional inputs to the students like accompanying audio and video streaming of an actual lab experiment and equipment.
4. For the '*touch and feel*' part, the students can possibly visit an actual laboratory for a short duration.
5. The conceptualization and development of Virtual Labs would require more effort, planning and coordination than the NPTEL project.

3.14.3 Approach to the problem

1. Identify the institutes who would be interested in participating and developing one or more Virtual Labs.
2. Identify one Institute Coordinator within the participating institute who will coordinate the efforts at his/her institute. It would be desirable to also identify one additional person within the institute who has some expertise in developing 3D Graphical User Interface.
3. The Institute Coordinator will identify at least 2 – 4 interested faculty members within the participating institute who will undertake the development of Virtual Labs in their areas of interest. A Virtual Lab would essentially consist of a set of 8 – 10 experiments in the chosen topic. The Institute Coordinators will also finalize the hardware platform, operating system and development software that will be uniformly used for the Virtual Labs project.
4. Each participating institute will suggest 2 – 4 Virtual Lab Topics (with approximately 8 – 10 experiments and related write-up). The choice of the specific topics for the Virtual Labs may come as a proposal from the participating institute. Alternately, the

participating institutes may choose from a list of ‘suggested Virtual Lab Topics’. The proposed topics will be discussed among the various Institute Coordinators to ensure no overlaps and proper coverage of the important disciplines. In case of overlaps, a collaborative effort may be envisaged.

5. Based on the projected number and type of Virtual Labs, a participating institute will put forth a proposal for funding.
6. The participating institutes will present the status of work and share their experiences during a Seminar on Virtual Labs, which will be held in 2007. The difficulties and bottlenecks will also be discussed.
7. The development of Virtual Labs will be carried out in two phases.
 - (i) In the first phase, the participating institutes would be identified and the *modus operandi* will be finalized. The purchase of equipment, software and hardware will be carried out in order to set up the infrastructure for developing the Virtual Labs. Hiring of manpower with relevant domain expertise will also take place. Approximately 10 Virtual Labs sites will be developed in the first phase. Each Virtual Lab will consist of approximately 8 – 10 experiments and related write-up. Once developed, the Virtual Labs will undergo beta testing. The duration of the first phase will be **two** years.
 - (ii) In the second phase, 10 more Virtual Labs sites will be developed with approximately 8 – 10 experiments and related write-ups. Additional experiments will be designed for the Phase one Virtual Labs. Virtual Lab development in the second phase will also benefit from the feedback received from the trials of the Virtual Labs developed during phase one. The duration of the second phase will be **three** years.

3.15 Development of Certification & Testing Modules for Virtual Technological Universities & creation of VTU, multi media research and international Programmes

The proposed Virtual Technical University (VTU) shall serve as a nodal agency for imparting training to the undergraduate and postgraduate students as well as the newly recruited teachers in the fields of science, technology, management, architecture, pharmacy and other applied areas. The University will provide flexible, credit based courses to all registered participants using modern technology. The modern technology will involve (i) Video courses (ii) Web-based learning material and (iii) live lectures using satellite and Internet based technologies. The aim of the VTU is to serve as an agency to impart training to a large section of students who are keen to receive instruction in an ambience close to the Indian Institutes of Technology (IITs) and Indian Institute of Science (IISc.). VTU will help them in updating their knowledge and advancing their career objectives.

VTU will endeavor to be a world class institution for providing undergraduate and postgraduate technological education, in distance learning mode, to a large number of regular students, young teachers at various engineering colleges and professionals in an industry. Needless to say, it would offer a modular approach to education, permit horizontal transition and provide honorable exits at appropriate stages for the students.

It is envisaged that the post-graduate program of VTU would begin in the first phase. All post-graduate programs of the VTU will be administered using (i) a repository of Video courses created by very well-known experts in their field (ii) a website that will host the web-based learning material and (iii) the live lectures delivered in distance learning mode based on satellite and Internet technologies. The primary responsibility of the VTU will be the management of these courses and maintaining the infrastructure with a high level of reliability. In the subsequent phase, the VTU will offer flexible, credit based academic program to the undergraduate students.

The VTU will develop course material, using the expertise available in the country as well as in partnership with the national programs, such as NPTEL. The course material will be in the form of video tapes, web based learning information as well as course ware in the form of reference material. For the creation of all the course ware, the VTU will engage a large pool of talented faculty members from IITs, NITs, IISc and other national technological institutions, including the superannuated faculty. As such the huge reserve of well known superannuated faculty members from the IIT system, and IISc will play a vital role in content creation.

The VTU will also focus on general engineering, system engineering, holistic approach to education, integration of curriculum from class VI onwards with high level education in the fields of science, social science, engineering & technology etc. offering specialized / non-specialized degrees with flexible, credit based modules, incubation and innovation, web based dynamic system of examination and evaluation, best practices in e-education administration for courses, homeworks, assignments, marksheets / certificates issuing etc. It would also strive for setting up internal infrastructure, in each IIT, for implementing virtual online certification programmes in science and engineering.

VTU would also set up a super computing facility to carve a niche for itself in the world for research facilitation and for fulfilling its objective of capacity building for students and researchers in frontier areas of science & technology.

3.16 Experimentation and development of ultra low cost low power consuming access devices/ laptops for a wider coverage of learners & their field trials

Even the best e-content can not have any significant impact unless it reaches the vast majority of learners with ease, as and when they demand it. With very low levels of computer ownership and broadband connectivity in the country, it would be well nigh impossible to reap the benefits of ICT in the field of education for all learners, including KG-20 students, life long learners, learners in need of vocational skills and those in need of livelihood or life skills.

Our target has to be to make the access to computer and broadband so easy that even the have-nots get encouraged and empowered.

Fortunately, the prices of the computer hardware and bandwidth charges are continuously falling at a substantial rate and if efforts are mounted in this direction by synergizing the expertise available in the country, it should be possible to develop ultra low cost access devices / laptops having very low power consumption within next 2 ½ years or so.

If it becomes possible for every learner to have a laptop at a price equal to the cost of books for one year of studies, and the course content is made available to the learner free of cost on his / her laptop, it would bring about a revolution. The gateway to networked e-learning would be thrown open for every learner in the country with the place, time and curriculum of his / her liking. It would be possible to access immense volumes of open access content on the internet in addition to the specifically designed content for them on Sakshat.

It is easy to find out that a very large portion of the cost of hardware is on account of the R&D costs and IPR cost. A given popular processor may cost thousands of dollars in the international market at the time of its launch but once superseded, its price falls to a few dollars only. This means that the real cost of manufacturing it would be very small if the R&D, IPR and fabrication facilities are owned by the country.

Laptop prices have fallen to nearly \$100 per laptop level already with the development of One Laptop per Child (OLPC) machines at Media Labs MIT, USA. But considering the very large magnitude of the problem and meager resources in our country, if such laptops are to be provided to 500 million learners in the country, it would require a whopping \$50 billion for us which we would not be able to afford. Having these machines would also have related problems of maintenance etc. Our requirements could perhaps be served if the prices were to fall to a level of \$10 per laptop because, in that case, the total cost of such laptops would be just \$5 billion which the learners could easily bear. For those who may not be in a position to

afford it even at that price level (economically weaker classes), the Government may step in to provide it to them either at subsidized rates or totally free of cost.

Thus, it makes a strong sense to provide money for research in this area. Indian institutions of higher learning such as IISc and IITs etc. do have the expertise to take up research in this challenging area and if facilities are needed for further research and fabrication, they could be created within the fundings available with various Ministries working in the field of Electronics, Communication and IT. The vast pool of B.Tech and M.Tech students could also be encouraged to take up projects in this area as their final Project / Dissertation with suitable guidance from the Professors in this field. Some of the Indian Companies in the private sector who are already selling similar products, at nearly \$150 per laptop, could also be encouraged or provided incentives to focus their attention in this area.

In order to galvanise the potential available in the country to make such access devices a reality and to ensure that the developed e-content are seamlessly delivered to the learners requiring them, the National Mission needs to assume the responsibility for field experimentation of low cost devices and their development and even for the steps to ensure their production.

3.17 Talk to a teacher to provide a substitute for coaching for the economically poor students

The facility of *Talk To A Teacher* online for interacting with him / her off-line has been active on **SAKSHAT: One Stop Education Portal** w.e.f. 26th January, 2007. This feature ensures that students are able to clarify their doubts and are not left at the mercy of the e-content alone. It is possible for a teacher in a studio to multi-cast the doubt clearing session if many students have similar doubts. Alternatively, asynchronous mode could be used for individual queries. This feature compensates for absence of teacher in a distance learning environment. Regular availability of an expert teacher helps students clarify their doubts as and when they arise. It has been found that during the examinations this feature has been very much appreciated by

the students. This feature would become more popular as more and more students take to web learning. Through this facility it is possible to make available services of excellent teachers on the web and students both rich and poor alike can make use of this facility without spending any money. The expenditure on this account, however, would have to be borne by the Government. It is expected that by employing excellent teachers, the handicap of poor students in joining costly coaching institutions could be mitigated. The focus of students may also shift from being coaching oriented to being knowledge oriented over a period of time. Every expert teacher may have an individual chat room so that students of a particular class are able to interact with him / her.

If the number of students using this facility grows, the number of teachers to guide them and clear their doubts would also have to be proportionately increased. This would mean that teachers would have to have a computer, a web camera, microphone, speakers, and a broadband connection at home, so as to respond to the queries of students at specified points of time. Depending on the requirement during a specific period it is also possible to depute renowned teachers to the studios to cater to the requirements of the students.

Teachers would also need to be compensated for their time which they would be giving to the students at large. It is well known that many good teachers take to the highly lucrative world of coaching. The remuneration to be paid to them under the National Mission may not match what they could earn through coaching but it could be in the form of a token, along with recognition of their efforts in the endeavor of building the knowledge base of students.

During the initial phases the scheme may require some adjustments within the projected budgetary requirements. The scheme may require adjustments in a number of subjects, number of chapters, number of hours for which the facility would be made available, and the number of expert teachers per chapter.

Such a free facility of expert teachers would go a long way in helping poor students gain a level playing field with those who could afford costly tuitions / coaching. In the long run it would also be highly beneficial for the knowledge economy which the country is ushering in.

3.18 Development of software controlled hardware programming for robotics & other crucial areas

In order to retain its leading edge in this knowledge world, India needs to think of the technological areas that might emerge in the coming 5-10 years. We need to gear up facilities in research and to prepare manpower well trained in those areas to capture technological initiatives. We need to build up a critical mass of intellectual properties for a head start in those directions. We also need to keep an eye over the core competencies being built up by technological leaders and our competitors and to continuously fine tune our strategies in response to their moves. Such areas could be innumerable such as Information Sciences, electronic hardware, manufacturing, robotics, bio technology, bio informatics, nano-technology, energy sources and energy systems etc. We need to allocate resources for spurring research and educational activities in these areas. We also need to develop and manufacture educational products through which our students in even 2nd and 3rd tier colleges could also gain, immensely, and become effective members of our knowledge workforce.

One such initiative has been conceptualized by IIT Bombay in the field of robotics and hardware designing / programming through software.

A major shortcoming of Indian science and technical education is the lack of “hands-on” approach. A good way to tackle this lacuna is to promote project-based learning and innovative systems building through readily available off the shelf components or specifically designed ultra low cost kits.

Other initiatives could be ultra low cost design and simulation kits for students of science and engineering which could help them conduct experiments and enhance their design skills in the relevant field after going through the e-learning modules.

3.19 Adaptation & deployment of open source simulation packages like ORCAD, Silab etc.

For most of the students of Science, Social Science, Engineering, Management and related disciplines, many simulation software packages such as MATLAB, ORCAD, AUTOCAD, CIRCUIT SIMULATORS, FINANCIAL & STATISTICAL ANALYSIS PACKAGES etc. have become an essential part of their curricula. To survive in the world of knowledge and remain productive, it is almost imperative to be well versed in them. This scenario is likely to expand further. Many of these are quite costly and most of our institutions of higher education may either not be able to afford them or may not have expertise on campus to teach students how to use them. This could also have an impact on the employability of our students. Fortunately, many open source software with look alike features and similar educational value are increasingly becoming available. But we need dedicated teams to make them user friendly and properly documented and to create adequate manpower to teach students to use those packages. Such packages, tailored to suit the needs of our students should also be made available on Sakshat for being made freely available to any student, teacher or institution willing to make use of them. Small groups of experts in each of these areas could be set up and entrusted with the responsibility of performing the tasks mentioned above and always keeping the packages up to date.

3.20 Development of unified Enterprise Resource Package (ERP) system for Educational Institutions

Education sector in India is moving towards an expenditure level of 6% of GDP. Education being in the concurrent list, both the Central and the State Govts spend a sizeable portion of their resources on Education. With a scattering of resources, often it becomes very difficult to comprehend as to what are the overall initiatives and the pace at which we are moving towards them. Dovetailing with initiatives launched by other agencies, synergizing and strict monitoring of deliverables and cost effectiveness of the interventions could be better achieved if there is a comprehensive ERP system for the Educational Institutions as a whole which could also establish linkages and aggregate micro parameters to indicate overall progress patterns and areas of weakness.

The ERP system being visualized should be integrated, inclusive and networked so as to, inter-alia, provide all kinds of feedback on progress of students, quality, absenteeism, vacancies, infrastructural facilities, information about access and equity issues, community participation, exchange of learning materials, library utilization, research activities, academic activities, seminars / symposia, funds utilization, sharing of innovation and good practices, students health monitoring, teachers and institutions grading to spot excellence, monitoring of scholarship delivery and financial hardships of students and any other matter of concern. It may also attempt to monitor capabilities of students and teachers and effectiveness of various interventions being made for improvement.

With the networking of all the institutions of higher learning, it would be possible to implement such an ERP system for the Colleges and Universities in the first phase, which could be expanded to cover secondary schools in the second phase and primary schools in the third phase.

3.21 Publicity & training of motivators to ensure full utilisation of the systems by institutions & students

No amount of hardware, software, e-content, access devices and connectivity networks is going to help unless the real user is able to derive benefit from the opportunities being presented to him / her through application of ICT to education. The need of dedicated change agents, motivators, guides, trouble-shooters and independent referees has to be much higher if the programme is to transform into a mass movement. They could also serve as our eyes and ears for various segments of our National Mission such as imparting Digital Literacy to the masses through Non-Governmental Organizations (NGOs) or volunteers.

A reasonably good structure could be evolved if, at least, two such motivators are in position in every district, working almost full time. For 600 districts in the country, there would be requirement of 1200 such motivators. At the rate of Rs. 100000 per motivator per annum, it would require Rs. 12 crores, annually, for a few years till the programme becomes popular and starts spreading by itself and through positive publicity by its satisfied users.

In the initial phase, a proper awareness campaign would also have to be launched through TV, radio and print media so that the target groups of learners are sensitized and empowered to use the facilities.

Our efforts in these directions could be spearheaded by a group of say 50 retired eminent Professors of the country who could dedicate their time, energy and intellectual prowess for this cause. Even at the rate of Rs. 4 lacs per Professor, it would require Rs. 2 crores per annum.

3.22 Conversion of available content in various regional languages

Even though good knowledge of English language may help a person avail of the opportunities existing globally, there is no denying the fact that mother tongue still remains the best language of understanding and articulation, especially in the lower classes. In most of

the School Boards, regional languages do have a prominence as a medium of instruction. Hence, the e-content being developed for learners from classes KG – 20 would also need to be made available in various regional languages. This could be done either through translation of the text or audio based material developed in English or any other language or a de-novo development of the content in the regional language but closely following the content, pedagogy and manner of presentation of the original. In doing so, we need to ensure that the nuances of the explanations of a topic do not get lost in translation. Subject experts who know the regional languages well would be required for the translation of certain topics . However, the enormity of e-content available on the web would propel us to move in the direction of machine translation of content, which, perhaps, the National Translation Mission may try to develop. The additional challenge in this activity is that many of the e-learning modules available in the public domain over the internet are in English which would either need to be dubbed / sub-titled or re-done in the regional languages.

3.23 Development of Vocational Educational modules and use of haptic devices or education & training

The modernization of skills is most demanding because of development of new areas of engineering and service sector. This needs ‘hands’ on and onsite training. It is also well known that establishing the infrastructure to meet the numbers required is an impossible task. Therefore, extending online training through video transmission becomes the key.

A number of industries in the manufacturing and service sector (like electricity) face severe shortage of manpower. Hence, it is urgently required to build education systems which are based on connectivity, so that local mentors can explain about transmitted knowledge.

Setting up labs around India, at one go, for all training institutes, is not only impossible (because shortage of manpower who can train students) but also an expensive task. Major issues related to the unemployed youth in rural India can be addressed through e-learning

system for training. Not only the youth, but interested person could learn the skills available to qualify and seek employment.

Vocational Education is mostly connected with development of skill based knowledge which could empower the learner to perform economic activities and help earn a livelihood. In the distance learning mode, imparting of knowledge through various techniques is easily possible but the real challenge is providing 'hands on' experience and a feel of performing the task. Simulators and virtual reality experiences provided through the computers do bridge the gap to some extent but they are still short of providing the training in a hand holding manner – a manner in which new apprentices learn at the workshops. Motions of limbs in a coordinated fashion to perform a given task is what often builds the specific skill. This is often not possible through the simulators but with the help of haptic devices. A pre-programmed instruction set on a computer can impart skills even through training of physical movement of the limbs and the force which is required to perform that activity etc. Such a mode of learning would provide a thorough grounding to the learners in the areas of vocational education and drastically reduce the time required by the trainees to grasp the real world feelings in an actual workshop in a much shorter time. It may also help in high quality training and testing and assessment of the learners in those areas by measuring the physical stimulus and effort applied by the examinee in performing a given sequence of activities.

Once developed, this technique is expected to remove many of the weaknesses of the present vocational education system and provide a way of taking vocational education to the masses while bringing some glory and prestige to it.

3.24 Connectivity and Bandwidth Issues:

The back bone of e-learning/education is connectivity because all learning material in the form of text, audio and video can be made available to all, at cheapest and most effective fashion, through good bandwidth and its connectivity. Whether it is the synchronous mode or asynchronous mode of e-education it would not be possible without 24*7 connectivity with a

good bandwidth. The quality of transmission of lecture and labs is directly affected by the availability of bandwidth.

An integrated model for connectivity based on satellite, terrestrial [OFC / Copper], wireless would need to be developed for connecting every educational institution to begin with and then to every Indian, subsequently. The bandwidth provisioning would have to be considered as an educational infrastructure and bandwidth for educational purposes would have to be made free from the user's point of view.

3.24.1 Components of CONNECTIVITY

1. Communication & bulk storage servers at 100 institutions
2. EduSAT teaching hub at each of the 100 Central Institutions
3. 2000 nodes for 1 Gbps connectivity, at each of the 100 Central Institutions, to be connected through BSNL Internet + VPN Plan
4. EduSAT Satellite Interactive Terminal at each of the 18000 Institutions of Higher Learning
5. 15-20 nodes for 7.5-10 Mbps connectivity at each of the 18000 Institutions of Higher Learning connected through BSNL Internet + VPN
6. 6 uplinking hubs for 6 National Beam transponders of EduSAT Plan
7. Provision of 1000 DTH Channels for Eklavya & other video based programmes including iPTV for e-learning
8. Provision of 100 PC in 18000 Institutions of Higher Learning @ 1 per faculty member on 50:50 cost sharing
9. iPStar satellite access device @ \$250 per device for $100*300+18000*5 = 120000$ terminals but limited to $1/10^{\text{th}}$ of this number for North-East only.

10. Bandwidth Charges for ipStar

Establishing a strong communication network between institutions of Higher Learning is imperative for the spread of the best practices and the best knowledge modules, encouraging shared learning from the experts in the country. With links to the internet, it would be possible to keep abreast of fast expanding knowledge universe and to avoid the possibility of reinventing the wheel, at least in those spheres in which the knowledge modules are available in the public domain. However, it must be kept in mind that what is available today in public domain may very well be shifted to priced domain by its author at any point of time, in the future. Hence, there is no easy escape from becoming a net donor of knowledge modules on the internet which could be exchanged with other organizations for an equivalent worth of intellectual property.

We also know that research in a particular area moves rapidly only when there is a critical mass of Professors, researchers and students in that area working in close coordination, even though physically not very proximate. Such groups act as research output multipliers when one path breaking research encourages the other researchers in that area to join hands with the spearheading group. Given the current state of scattering of resources and experts among various institutions of higher learning in the country, a strong communication network would be able to forge a strong bond between various groups working in similar areas. However, it must be borne in mind that the communication highway should not outgrow the demand of traffic of knowledge modules and information exchange, so that it does not become obsolete by the time traffic volumes on this information highway grow, to even partially utilize the capacities provided by it.

It is with these considerations in mind that within the contours sketched by the Oversight Committee, equal emphasis has been given on content generation, very strong connectivity between 100 Central Institutions (a few more than the 84 enunciated by the Oversight Committee), connectivity for all Institutions for Higher Education in the country and gradual

movement towards covering all educational institutions in the country. With this philosophy, it is proposed to transform the 100 Central Educational & Research Institutions into hubs for the creation and dissemination of knowledge for every learner in the country. They have also been visualized as the repositories of knowledge generated / acquired either in text, audio-visual or any other form and to serve as models of National Classrooms, in their respective areas of excellence.

Yet another philosophy adopted in the area of Connectivity is that instead of purchasing costly LAN / WAN [Local Area Network/Wide Area Network] equipments for each of the institutions, this entire activity is proposed to be outsourced to the network provider such as Bharat Sanchar Nigam Limited (BSNL) etc. The recent statement of the Minister for Communication & IT indicating that State owned companies like BSNL etc. would enter into content hosting themselves and then the country would be moving towards free broadband for all – a demand articulated by us for sometime now, after H.E., the President of India voiced his dream of free connectivity for all at the time of launching of Sakshat: A One Stop Education Portal of the MHRD.

There is a possibility of having a plan which could give Internet upto 2 Mbps speed with 4 GB free download per month and 512 Kbps unlimited bandwidth in MPLS VPN at a cost of Rs. 12000 per year. If this comes through, the infrastructure of routers, switches, servers and cables etc. could all get outsourced to BSNL or any other bandwidth provider who could be at least equally competitive. This would obviate the need for creating LAN infrastructure in Central Educational Institutions campuses as the large number of nodes (2000 for each Central Institution) with 2 Mbps internet connection speed (4GB free download per month per connection) and 512 Kbps (uncompressed) MPLS Virtual Private Network (unlimited usage) would effectively double up for LAN in the campus and WAN for any other node on this VPN in the country (i.e., any educational institution for higher learning). The money so saved (as compared to the estimates in the Oversight Committee report) could be utilized for connecting all 18000 colleges in the country and on an average, 10 departments of every University in the Country. Obviously, $2000*100+20*18000+20*10*360 = 632000$ such connections would

make available $512 * 632000 \text{ Kbps} = 323 \text{ Gbps}$ of effective domestic bandwidth shared by all the Institutes, with which even lectures could be transmitted or video conferencing could be done in multicast or unicast mode among all the institutions of higher learning in the country. In addition, if we assume an over subscription or concurrency factor of 50 by BSNL, an international internet bandwidth of $2 * 632000 / 50 \text{ Mbps} = 25.28 \text{ Gbps}$ could be made available to these institutions, all at a total annual cost of $\text{Rs. } 12000 * 632000 = \text{Rs. } 758 \text{ crores}$ when the system is fully utilized i.e., each of the 100 Central Institutions are fully utilizing 1 Gbps bandwidth and each of the University Departments and each of the 18000 colleges in the country are fully utilizing 10 Mbps of uncompressed national bandwidth. Obviously, this capacity utilization would not take place in the first year itself as the bandwidth utilization is nearly one tenth of this planned capacity at present and hence, the funds required would be lower in the initial phases as only that much bandwidth would be taken as is required.

Proper utilization of existing capabilities of EduSAT has also been factored in and recent advances in the communication technology area have also been kept in mind while visualizing the national network. Utilisation of DTH for beaming various educational lectures has been visualized. The soon to come initiatives of ISRO have also been factored in to provide a triad of connectivity architecture. It is envisaged to have about 40 – 50 transponders from Indian satellites to enable telecast of 1000 DTH channels simultaneously. This would enable availability of one DTH channel for every subject for every class and in many of the regional languages. This would reduce the waiting time for watching the next lecture on that subject / topic or for repeat telecast based on demand. These channels would also help reduce load on the intranet VPN through reduction in the number of repetitive downloads of the same video content by various students.

It has also been presumed that for most of the colleges in the country, the number of PCs available would not be large enough to provide facilities to students and academic staff for some considerable time every day. UGC has decided to provide internet connectivity at the residences of each of the nearly 5 lacs teachers in the country. But the ICT assisted learning

would not take off and make a major dent on the prevailing situation unless computers are available in each of the colleges at the rate of at least 1 computer per academic staff. Some colleges may find it to be an extra burden, but it is a fact that learners of our country are being educated there and if their standard is low, we, as a country, stand to lose. Hence, it has been considered prudent to share the cost of providing PCs in the ratio of 50:50. The maintenance and updating responsibilities would have to be assumed by the colleges themselves. Some pressure could also be built on them by providing the norm for minimum number of computers to be held by these institutions in the University Grants Commission/All India Council for Technical Education/Distance Education Council (UGC/AICTE /DEC) guidelines. In computing the cost of PCs, an upper limit of Rs.20,000/- has been presumed but it is common knowledge that the cost of hardware has been falling very rapidly and PCs would be available at much cheaper costs. Simultaneously, efforts are on to develop a very low cost computing-cum-access devices. Such devices are expected to be available at a cost of around Rs.4,000/- at present and the prices are further expected to go down. Since provision of computers is going to be quite cost-intensive, at least for the private educational institutions, 50% sharing of cost of computers would be considered in the context of very low cost computing-cum-access devices as and when they become available.

Since State Government educational institutions and private educational institutions would be contributing 50% of the cost of hardware and 25% of the cost of connectivity/bandwidth charges, the availability of funds for competing these activities would be as follows:

(Rupees in Crores)

Activity	Provision under the Mission from Central Government	Contribution of the State Government or private institutions	Total availability
Hardware	700	700	1400
Connectivity	1000	300	1300

The above figures are based on the presumption that the opportunities provided to the State Government educational institutions and private educational institutions are utilized to the fullest possible extent by them. In case they do not utilize the opportunities fully, the expenditure on these items would be lower from the Central funding also.

Notwithstanding anything mentioned above, the approach would be to seamlessly integrate with the Integrated National Knowledge Network (iNKN) in order to avoid duplication and attain synergy.

Under the National Mission on Education through ICT, provision of connectivity is basically through rental payment to the Service Provider(s) like Department of Telecommunications/Bharat Sanchar Nigam Limited (DOT/BSNL) and there is no provision for creation of any permanent communication related infrastructure (except last mile connectivity) in the Institutions. As soon as connectivity to the extent of 1 Gbps is provided to the identified 100 premier Institutions under the NKN, the rental payments to the Service Provider, would be got stopped by the MHRD. In the future, when NKN expands and takes over connectivity provisioning for other Institutions even beyond the first phase 100 premier institutions, rental payment to the Service Provider for those Institutions would be stopped from this Mission, thereby avoiding any possibility of duplication with the NKN or any wasteful expenditure.

4 Projected outcomes

Following are envisaged as outcome of the proposed Mission:

1. Achieving cost effectiveness of approach, enriched experience of learning, enhanced access and suitability of educational resources, flexible timing, and quality, accountability & relevance of learning modules etc. for a paradigm shift in our approach to education and learning in all areas.
2. Creating a platform for sharing of ideas and techniques and pooling of knowledge resources,

3. Making use of already available large volumes of video content, generated over the years.
4. Making available high quality e-text books, e-reference books, e-research papers and e-content in different languages and also the software required/used for learning, free of cost to the genuine learners.
5. Providing opportunities to teachers and intellectuals for contributing to the world of e-knowledge.
6. Ensuring access to high quality higher education and thereby ensuring that financial/economic considerations are not a barrier for serious and committed learners.
7. Leveraging e-learning as an effort multiplier for providing access, quality and equality in the sphere of providing education to every learner in the country.
8. Bringing efforts of different interested agencies working in the field of e-learning under one umbrella and establishing logical linkages between various activities.
9. Encouraging multi-lingual content development for the learners more comfortable in those languages.
10. Promoting development of interfaces for other cognitive faculties (such as voice support for educational material delivery and interactivity for the content on the portal) which would also help physically challenged learners. These efforts may cut across all the content generation activities.
11. Setting up virtual labs and lab centers and finishing schools for quality enhancement.
12. Optimising content delivery through EduSAT and narrowcasting of TV signals. Providing 1000 DTH channels on 40 transponders [to be availed through Deptt. of Space] so that a separate DTH channel is available for every subject, for every class, in various languages to the extent possible.
13. Providing 1 Giga bits per second bandwidth for 100 Central / premier Institutions of excellence and 10 Mega bits per second bandwidth for each of the University Departments and each of the 18000 institutions in the country including university departments through terrestrial means and satellites for establishing a Knowledge Network.

14. Spreading Digital Literacy and encouraging teachers to be available on the net to guide the learners.
15. Creating opportunities for those people who are interested in life long learning
16. Evolving ERP and e-Governance for education.
17. Meeting targets of required manpower for supporting growth rate of 9-10%.
18. Bridging the gap of digital divide, knowledge divide, and financial divide among the learners and making every citizen capable of using ICT for education and training.
19. Creating opportunities for those people who are interested in life long learning
20. Ensuring that the connectivity shall also provide benefits to programs like telemedicine, kisan kiosks and overall and all round development of personnel and the country.
21. Facilitating those who want to do research in education and are keen to develop educational technologies for all.

5 Implementation Strategies

1. The proposed Mission shall, broadly, have a three tier strategy to achieve its objectives. It shall work for ensuring connectivity to all institutions of higher learning with a speed of 1 Giga bits per second for 100 Central Educational Institutions of excellence, 10 Mbps for 10 departments of each of the 360 Universities of the Country and 10 Mbps for 18000 colleges in the country using all possible means such as EDUSAT, Broadband satellites including those to be launched by ISRO in 2008 and subsequent years, terrestrial Broadband network of existing service providers, use of Radio and TV transmission towers and with the use of appropriate wireless technology.
2. The second tier of the strategy would be the standardization and formatting of the content already available and generation of new high quality contents with

appropriate pedagogical inputs. The e-content shall be incorporated with suitability index in the meta data to facilitate personalization of the baskets of learning for students with varying scholastic capabilities. There is also a proposal for creation of virtual laboratories for giving practical exposure to the students.

3. The Mission shall work for empowerment of those learners who are not familiar with the use of computer devices. The digital learning modules shall be prepared for the said class of learners to enable them to use the computers for the purpose of e-learning and making use of ICT to address their learning needs.
4. While doing so, one of our focus areas would also be the creation of a repository of traditional knowledge so that we can combine the best from both the spheres of knowledge, traditional as well as modern.
5. Such a vast network would also present to us an opportunity of ERP packages for integration, networking, synergization, monitoring and control of various activities. Such a system would, inter-alia, provide all kinds of feedback on progress of student quality, absenteeism, vacancies, infrastructural facilities, information about access and equity issues, community participation, exchange of learning materials, laboratory utilization, research activities, funds utilization, sharing of innovation and good practices, student health monitoring, teachers and institutions grading to spot excellence, monitoring scholarship delivery and financial hardships of students and any other matters of concern. Such a system is expected to contain scattering of resources and enable the Mission to dovetail with initiatives launched by other agencies, synergising with them, strict monitoring of deliverables, and ensuring cost effectiveness of interventions.

6. Through such a system we intend to do a continuous monitoring and also give support to the learners. When such a scenario unfolds we would like to make a paradigm shift from scholarship to talentship. At present we provide scholarship to meritorious and needy students. With the identification of talent in every field, be it in academics, vocational, art or any other field, we should be in a position to identify the talent and nurture it for its fullest contribution to the effort of national development. While doing so, we intend to ensure that no talent in the country should be allowed to go waste.

5.1 Implementation Guidelines:

1. The scheme would provide grant-in-aid to various projects in the identified areas and ensure their dovetailing to achieve the objectives within the optimum cost and time. It would have a rigorous peer review of the activities supported under the scheme so as to keep the projects on track and derive maximum mileage from them in realization of the vision for the National Mission.
2. At the apex level, there would be a National Committee chaired by the Minister of Human Resource Development [HRM] with Secretaries of Expenditure, Department of Information Technology (DIT), Department of Telecommunications (DOT), Department of Higher Education (HE), Department of School Education and Literacy (SE&L), Planning Commission, representatives of University Grants Commission (UGC), All India Council for Technical Education (AICTE), National Council for Teacher Education (NCTE), Distance Education Council (DEC), IGNOU (Indira Gandhi National Open University), Central Board of Secondary Education (CBSE), National Council of Educational Research and Training (NCERT) and Directors of all Indian Institutes of Technology (IITs), Indian Institutes of Information Technology (IIITs), Indian Institutes of Management (IIMs), Indian Institute of Science (IISc), Vice Chancellors of Central Universities, Directors of anchor institutions as members.

3. At the next level would be an Empowered Committee of Experts (to be known as Project Approval Board) that would be sanctioning individual projects and monitoring the overall progress through various peer reviews and concurrent evaluations.
4. There would be specific, area-wise core committees having the responsibility of ensuring success through synergized efforts of various experts / institutions in that area. They would be identifying various project activities and relevant experts / institutions who could accomplish the task. They would get projects prepared and sanctioned, in case the voluntary momentum and thrust in those areas is not sufficient and forthcoming from those who are capable of doing it. They would also focus their attention on capacity building in deficient areas and collaborate with world leaders in those areas internationally. They could also set up in-house teams for delivering the results and creating the spin-offs needed.
5. Funds should be given in a non-lapsable manner for the first year (because of delays in getting the scheme sanctioned) but with a rigid time frame for completion. There should be a separate earmarking of funds for convening meetings of experts and covering administrative expenses.
6. After the provision of a maximum of 30% of project cost for starting up a project, the rest of the release of funds should be strictly linked to deliverables and time frame.
7. Funds would be provided to institutions only and not to any individual. The institutions of repute could be in private sector also. Funds could also be provided for tie-ups and joint ventures in research areas with specialist national/ multinational companies or even highly capable start-up companies.
8. As far as possible, the norms would be evolved and dynamically updated to ensure uniformity of funding to various project agencies for similar types of activities.
9. Infrastructure created as part of this Mission would be a national property, usable by any of the projects undertaken under this Mission or any other specified Mission / project.
10. In case the Empowered Committee of Experts [to be known as Project Approval Board] finds it prudent to buy the Intellectual Property Rights of any software,

hardware or e-content etc., it would be possible to do so with a view to avoiding reinventing the wheel and to compress the time frame for achieving the results.

11. Remuneration received by any expert under any project of this Mission would be in addition to his / her salary, from his / her organization. The expert's contribution to successful completion of the project would be duly acknowledged.
12. Institutions of excellence, whether in public or private sector, could be identified as "Anchor Institutions" for carrying forward the thrust areas assigned to them. They will nucleate and expand the sphere of activities by bringing together experts and institutions in the country or abroad with a view to achieving the entrusted goals within the agreed timeframe.
13. Subject specific responsibilities would be entrusted to various identified institutions to maintain and constantly update / upgrade the e-content, conforming to the standardization and quality assurance norms evolved under the Mission. They would also ensure proper functioning of web sites for establishing active networks of experts in that subject area and take steps to integrate with the "Sakshat" web based portal strengthening their segments for ensuring that their e-content reach every nook and corner where ever and whenever a learner requires them to.
14. Knowledge modules in the form of e-content would be made available, free of cost, to every Indian learner. The State Governments., and other Institutions in the public or private domain would be encouraged to contribute their knowledge / expertise / available e-content, free of cost, for the use of learners in India.
15. Open access would be the key philosophy and collaborations with other similar efforts of high quality elsewhere in the world would also be explored.
16. To ensure proper roll out of connectivity for every institution of higher learning in the shortest possible time frame and in a cost effective manner, a group of experts from Ministry of Human Resource Development (MHRD), Department of Telecommunications (DOT), Department of Information Technology (DIT), Department of Space (DOS) headed by the Secretary (HE) would be the prime mover.

17. To get more value for money and for ensuring proper deployment of resources in the field of education, a comprehensively integrated ERP system for Education would be developed which would have interfaces with other segments of economy, making available the Human Resource database to them and obtaining Opportunities databases from them.
18. Efforts would be made for achieving the convergence of different systems of education and quality and access enhancements through available e-content so as to enable each of the educational institutions to move up the value chain.
19. Using EduSAT and other satellite transponders, e-content would be telecast over 1000 DTH channels on a 24X7 basis so as to provide dedicated channels for most of the subjects for most of the classes.
20. Through a combination of terrestrial and satellite based bandwidth, internet and intranet connectivity of 1 Gbps for 100 Institutions of excellence under the Central Govt., and 7.5 – 10 Mbps connectivity for each of the departments of 367 Universities and each of the 18000 colleges / institutions of higher learning in the country (irrespective of their being in public or private sector) would be provided free of cost to them on a continuing basis.
21. A one time grant, subject to a maximum of 50% of the cost of access devices procured by an educational institution, would be provided under this scheme such that the institution (whether public or private) achieves a level of having one access device per faculty member. The responsibility of maintenance and upkeep of these devices would be that of the institution.
22. The scheme would provide access devices to those students who are from extremely poor economic backgrounds and are unable to afford these devices for e-learning, in spite of the very low cost devices developed under this mission. Such students/groups of students would be given access devices, centrally, so that the digital divide does not get further accentuated. Taking over of supply chain costs for such access devices for certain identified regions or segments of society could also be considered.

23. For Mission roll out and activities relating to acquisition/procurement hardware, etc. in order to reap benefits of centralized procedure in terms of bargaining power and knowledge and distributed or localized procedure having benefit of greater control over the supplier and maintenance aspects, clusters of educational institutions would be assigned to mentor institutions. These mentor institutions would be reputed Central or State educational institutions, geographically distributed. They would provide the leadership initiative for the institutions in roll out activities and also in procurement activities. They would additionally discharge the functions of a control point for entering into agreements with the State Government educational institutions and private educational institutions for realizing 50% contribution from them for hardware procurement and 25% contribution from them in respect of activity/bandwidth charges. Authorization for connectivity would be issued only to those institutions which have entered into the agreements with their mentoring institutions. The procurement of hardware would be the responsibility of such mentoring institutions for the combined requirement of institutions being mentored by them. These mentoring institutions would have the additional responsibility of remitting to the Central Government the contributions recovered by them from the institutions being mentored by them.

6 Mission Structure

6.1 Committees, Management Structures & Organograms:

At the apex level, there would be an empowered group of experts which would have the power to sanction various projects based on the Detailed Project Reports (DPRs). Under the apex group, there would be activity groups – one for each type of activity of the National Mission. These groups would also have the stakeholders. At least one member of each of these activity groups would be represented on the apex empowered group of experts. These activity groups would be located in the anchor institutions entrusted with the responsibility of completing the activity in time with high quality.

This structure has been created to ease the administrative and management structure to maintain smooth flow of resources as well as to achieve efficiency and effectiveness. The following four layers shall be responsible for the administrative and financial approval for the strategy, planning and resources.

- Apex Committee
- Mission Secretariat
- Empowered Committee of Experts [to be known as Project Approval Board]
- Domain Experts Committee
- Program Advisory and Management Team

6.1.1 Apex Committee: Constitution : Chaired by the Minister of Human Resource Development (HRM) with Secretaries of Expenditure, DIT, DOT, HE, SE&L, Planning Commission, representatives of UGC, AICTE, NCTE, DEC, IGNOU, CBSE, NCERT and Directors of all IITs, IIITs, IIMs, IISc, Vice Chancellors of Central Universities, Directors of anchor institutions as members. This body shall play the pivotal role in policy making and provide overarching principles for the success of the mission. The role of the apex committee is to guide and mentor the activities of the mission. This body can suggest high impact ideas, formation of groups/networks/communities, projects and outcome usages. The apex committee shall create and identify major empowered committee of experts, domain experts committee and program advisory committee. There shall be the project advisory and management teams proposed by domain experts committee and programme advisory and management team for fulfilling the objectives of the mission.

6.1.1.1 Powers & functions of Apex Committee:

- ✓ Over-all policy making and direction for the Mission.
- ✓ Framing of guidelines.
- ✓ Nomination of members & experts on the Project Approval Board

- ✓ Strategy formulation & mid course corrections.
- ✓ Periodic review of outcomes and general monitoring of the Mission as a whole.
- ✓ Coordination between various Central Ministries and between Centre, States and NGOs etc.
- ✓ Addition / alteration of powers and functions of any committee or authority under this Mission.
- ✓ Decisions regarding delegation of powers (financial or otherwise) to various committees / authorities / functionaries involved in the Mission or its projects

6.1.2 Empowered Experts Committee [To be designated as Project Approval Board] :

Constitution : The Project Approval Board shall be chaired by the Secretary [Higher Education], MHRD and apart from renowned experts from Academia and Industry, shall have representatives from Department of Expenditure, Planning Commission, Department of Telecommunication, Department of Information Technology, Department of Space and Department of Science & Technology. This committee shall be responsible for ensuring implementation of the mission objectives by various committees and teams in the best possible manner. This committee shall comprise of eminent experts in the area of e-education. The powers and function of the committee are listed as follows but are not limited to these. The committee in consultation with apex committee can take decisions for the mission, in keeping with spirit of the objectives to be achieved.

6.1.2.1 Powers and Functions of Empowered Experts Committee [to be known as Project Approval Board]

- ▶ Critical appraisal and Sanctioning of various project proposals under the Mission based on the DPRs (Detailed Project Reports).
- ▶ Making recommendations to the apex committee on matters of importance
- ▶ Final negotiations / deliberations on IPR related issues.
- ▶ Selection of domain experts committee and program advisory committee of the Mission

- ▶ Promotion of any activity interest of the spirit of mission
- ▶ Management & funding
- ▶ Network of experts/**institutes/industry-institute/any network useful for the Mission** in various fields
- ▶ Deliberating on powers & functions of various committees

6.1.3 Domain Experts Committee: The committee shall be acting as a backbone, providing technical support. This committee shall be responsible for review of projects on a continuous basis. The mechanisms for streamlining projects and the integration of outcomes of projects shall fall in the jurisdiction of the committee. Broadly, the powers and function of the committee are suggested below.

6.1.3.1 Power and Functions Domain Experts Committee for Mission

- ▶ Review of progress and decision to release installments of grants for specific projects.
- ▶ Approval of milestones for deliverables of the project.
- ▶ Project monitoring at regular intervals
- ▶ Peer-review meetings for monitoring of progress and dovetailing with other projects in the same broad area of activity.
- ▶ Evaluation & testing of milestones and intermediate outcomes of projects in their domain.
- ▶ Assessing the utilization certificates submitted by Project Implementing Institutions.
- ▶ Primary negotiations on IPR related matters.

6.1.4 Mission Secretariat: These three committees i.e. apex committee, empowered expert committee and domain expert committee will be serviced by the Mission Secretariat. All the documentation, coordination and day to day support to all these committees shall be extended by the Mission Secretariat. This office shall play an important role as an interface between

various committees and MHRD. The office also coordinates with mini secretariat in anchor institutes

6.1.5 Program Advisory and Management Team: Major programs of mission shall be administered and managed under the supervision the committee. Interaction among different teams, groups and experts shall be assisted by the committee. The identification of all possible programs shall be done by the team so that outcomes of the mission become achievable. The overall integration across different major programs shall be supervised and evaluated by the team.

6.1.5.1 Power and Functions of the Program Advisory and Management Team

- Selection of project advisory and management committee
- Evaluation of Project progress
- Coordination to ensure smooth flow of resources
- Enabling execution and integration of deliverables
- Resolving IPR, copy rights and any other legal issues
- Flexible structuring of groups and sub groups
- Identifying feedback system and ensure that feedback reaches at appropriate group/sub group
- Restructuring and reorganization for timely completion of objectives

The above mentioned committees and teams would interact with organization/institutes/research labs. Anchor institutes and participating institutes shall be suggested to broadly create the following structure.

6.2 Structure in Anchor Institutions

Every anchor institution would have a mini secretariat for servicing the Mission-related activities being anchored or participated in by the institution. Head of the Institution assisted by a few departmental heads / Professors / Experts would oversee the progress related to this Mission. They would be adequately compensated for their time and effort in this direction, in addition to their normal salaries. In view of heavier load of Mission related activities, it would be possible for the faculty members / experts to devote themselves full-time for the Mission by opting to be on deputation to the Mission.

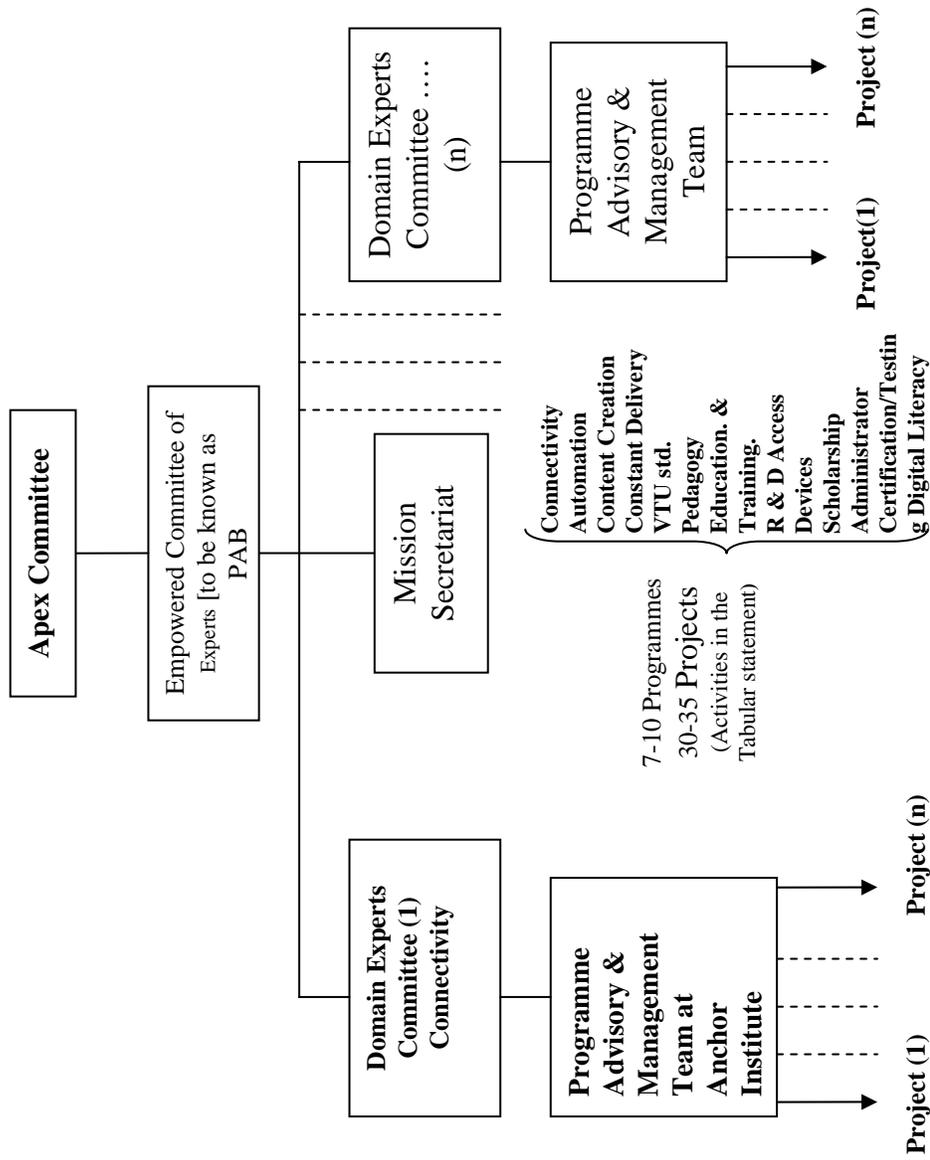
6.3 Structure in participating Institutions

Since requirements would vary from project to project, participating institutions in the Mission would suggest their administrative structure and delivery mechanism while preparing their DPR and would allocate reasonable funding towards this activity.

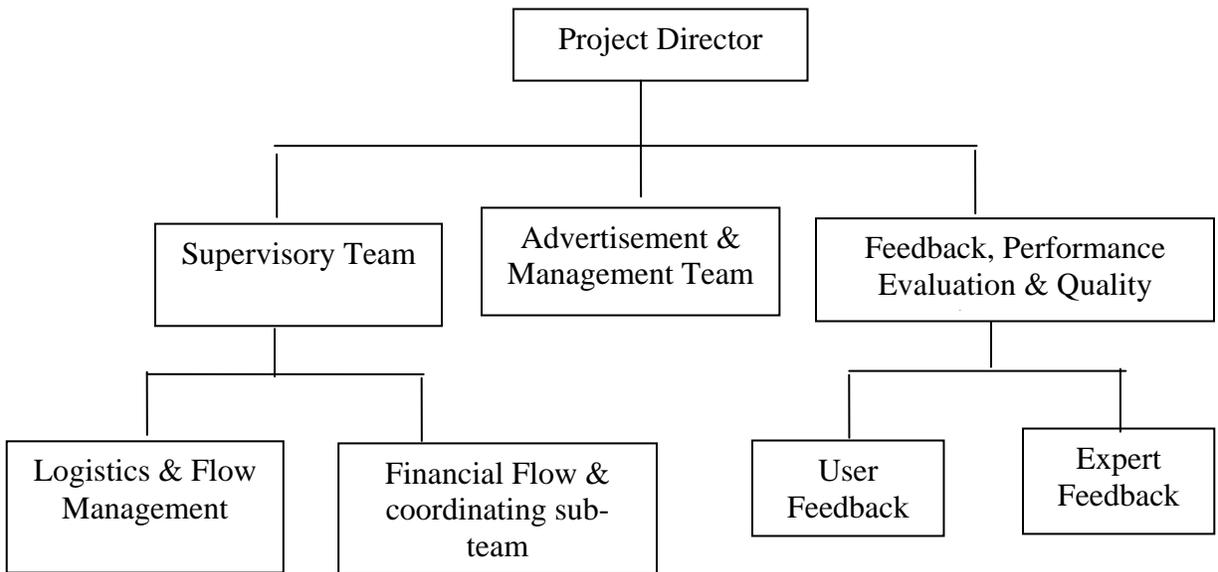
6.4 Research to field roll out structure

Since research in the field and extension activities require a different variety of professionals, each DPR would also suggest as to how the final outcome of the project would be delivered to the masses or how the production or operationalization would take place. It may require associating many start-up companies under the influence of the participating institution – something similar to Technology Information, Forecasting and Assessment Council (TIFAC) or those in the Industry Incubation centres of the institute. Entrepreneurs from such companies / outfits would be associated with the project activities from the beginning itself so that the thinking on bringing the results on the ground progresses side by side

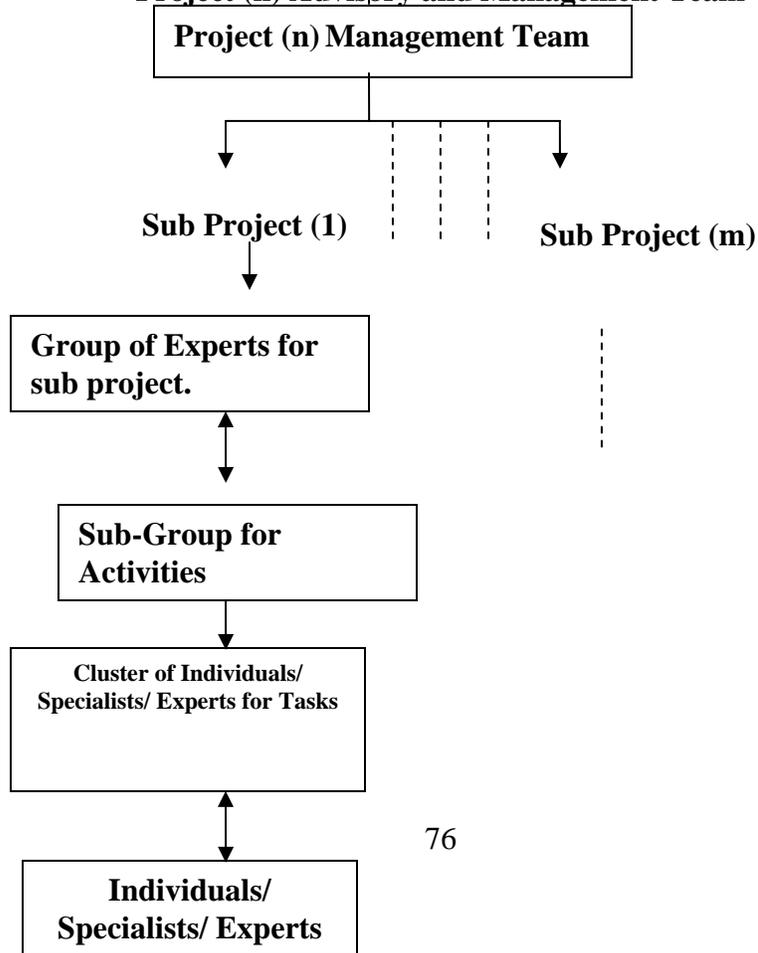
6.5 Organogram depicting the various aspects of the organization



Project advisory Management Team

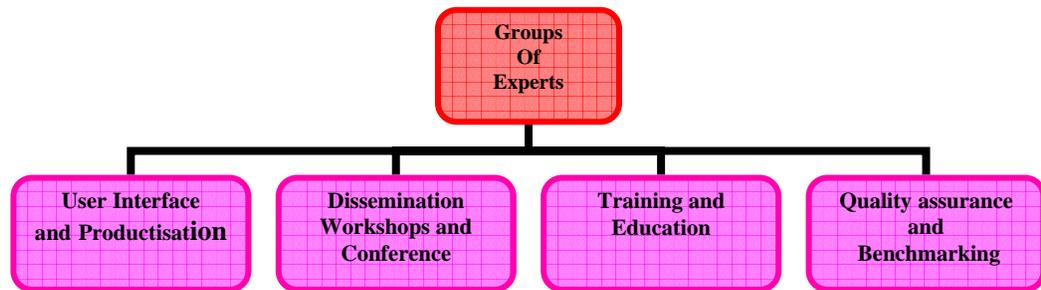


Project (n) Advisory and Management Team

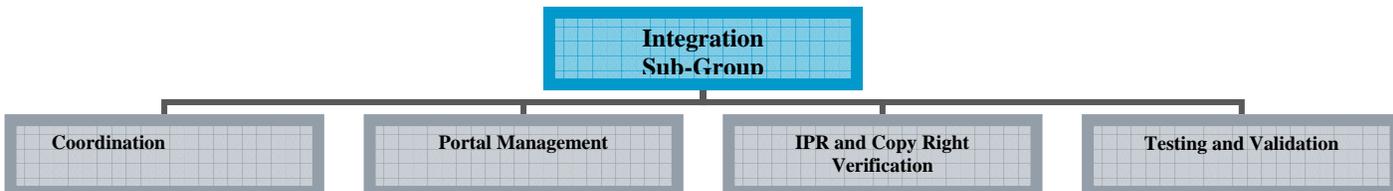


The structure of project advisory and management team and its interaction with other groups and subgroups is shown above. This team facilitates fruitful and healthy interaction among all stake holders of a project team.

All teams under the project advisory and management team shall be supporting and coordinating the groups of experts and the sub-groups of experts based on the needs and necessity. An example is shown below the group of experts.



The sub group activities are well defined by group of experts for example:

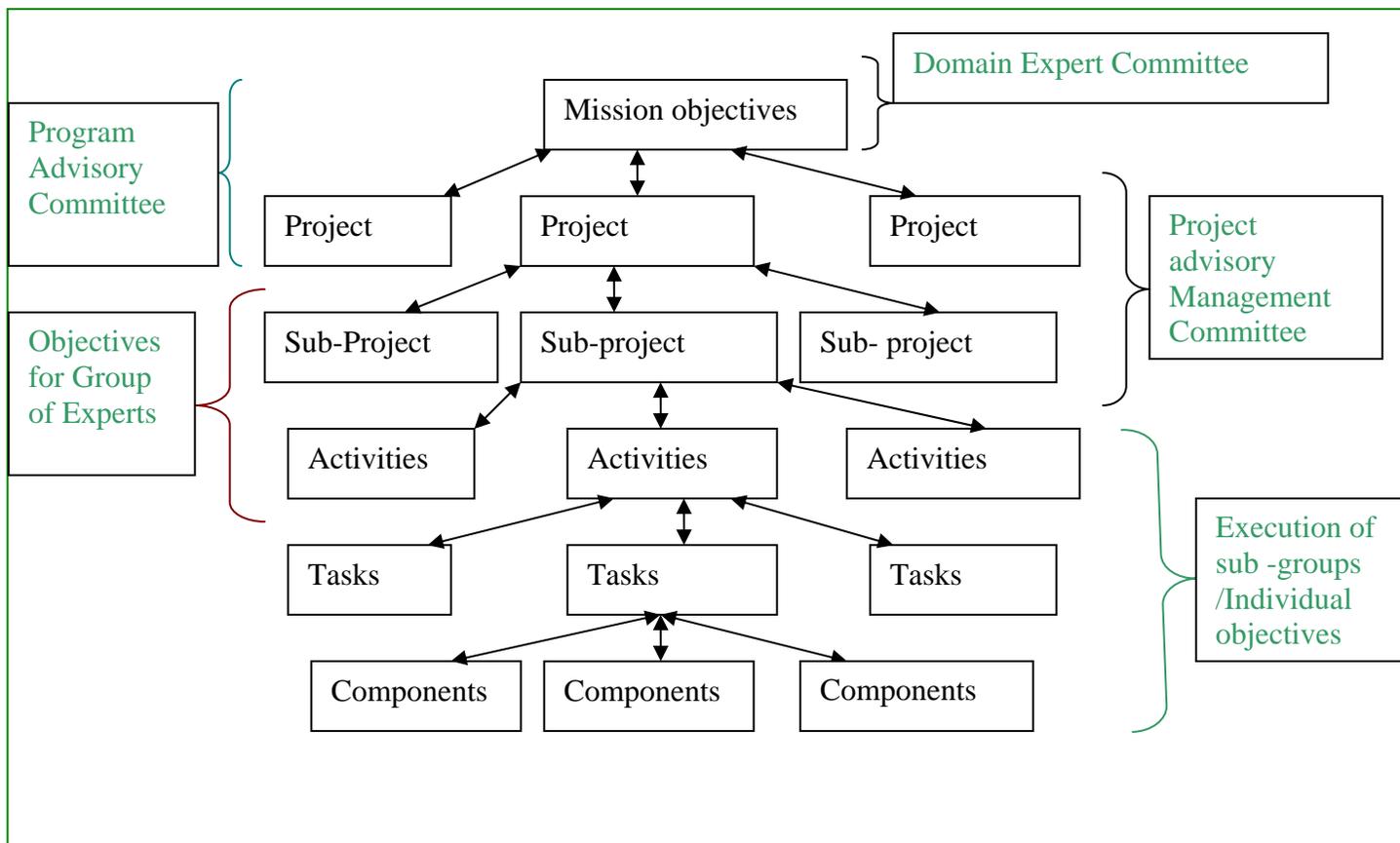


Each of the major projects shall comprise smaller projects and each individual smaller project shall be executed by group consisting of faculty/researcher/developer/expert. Every group may have subgroups depending upon the scope of small project.

Several possible teams have been representing in the above diagrams. These teams shall be responsibility to run groups/sub groups whose objectives in terms tasks and activities would be jointly agreed upon for meeting dead lines and delivering outputs so that other teams can integrate and validate.

Additional small teams can be created by each major project advisory and management team for the purpose of smooth running and achieving objectives in time. Since all major projects shall be divided into small deliverable projects for various groups of experts. For example the integration sub group shall be performing tasks across different groups therefore it is natural for them to be part of activities like coordination, portal management, IPR related activities, and testing validation. Another example may be activity like quality assurance can effectively and efficiently implemented across the set of projects and their activities. Since there would be a team for each project headed by team leader for example faculty member shall be focussing on the **project therefore his/her team would focus on the limited objectives. Therefore coordination needs to be done by management team.**

Summary of responsibilities and interaction among various levels of hierarchy is illustrated as follows:



7 Funding & payment norms for various activities

These norms would be suitably determined on the advice of the expert committees of domain experts by the Empowered Committee of Experts (to be known as Project Approval Board). However, the broad principle would be to release up to 30% of the project cost as 'mobilization advance' and link the release of the rest of the installments to the deliverables.

MHRD shall be fully responsible for releasing funds in time on recommendation of a competent committee. The Project Approval Board shall evaluate the feedback on the detailed project, with at least three national and international domain experts. The Project Approval Board in its recommendations shall clearly mention the timings and amount for the release. Criterion for recommending the project for funding shall be used

and would be mentioned along with request for release of funds. The funds once approved shall directly be released to competitive authority in organization/institutions.

The funds to private institutes and start ups can be released only through educational institutes like IITs. These institutes shall be responsible for delivery of outcomes stated against the release of funds.

In exceptional cases, the project approving committee can recommend direct release of funds to private industry/start ups and private educational institutes.

Fund release against the deliverable shall clearly be uploaded on the website of the project and also on the website of the Mission along with summary of project, for scrutiny by the stakeholders at all the times.

8 Intellectual Property Rights Management

These issues would be addressed to by a separate group of Domain Experts who would be assisted by the peer groups in that specialization and the members of the content advisory committee, in case it is regarding any learning object.

The content Advisory committee would identify the existing content and evaluate the content for quality. If required, it is proposed to enter into a Memorandum of Understanding with third party content providers. It is also proposed to provide a link to the existing content online after obtaining the IPR clearances. There will be a committee of experts-instructors, subject experts and instructional designers who would undertake an analysis of needs to determine the learning objectives required to make the targeted audience competent in the subject matter. This group would also include curriculum developers who would consider the target consumers and then specifically define the content required for them. The group will constantly assess the content and the updating it in the context of the feed back received by all the stake holders.

9. Activities that could be funded

1. Any research, development or extension activity leading to or assisting in fulfillment of the goals envisaged for any of the key components of the Mission. The expenditures, inter-alia, would also cover costs of manpower, equipments, contingencies and travels.
2. Setting up of any centralized infrastructural facilities for achieving any of the activities mentioned above.
3. Popularizing the facilities / functionalities of the Mission with a view to achieving their greater utilization by the people at large.
4. Engagement of experts, change agents, motivators.
5. Purchase of e-books, e-journals, IPRs etc. necessary for accomplishing activities of the Mission.
6. Setting up and up-scaling of web based portals for various crucial activities under the Mission.
7. Organizing workshops, conferences (both national and international) for deliberations and content generation under this Mission.
8. Organizing lectures of world renowned scholars with a view to making them available for Indian learners through the web based portals.
9. Bandwidth charges for providing connectivity to Institutions and learners.
10. Cost of access devices for accessing the e-content to be made available over the internet, intranet etc.
11. Cost of computer software, hardware etc., as required in connection with the Mission.
12. Leasing charges for satellite transponders, DTH platforms, FM channels, dedicated circuits / communication channels and related equipments for them.
13. Cost of kits for providing digital literacy.
14. MOU based collaborations with renowned Indian / multinational companies for achieving specific research activities under the Mission or for undertaking production and roll out of the achievements in the research labs.

15. Procurement of stocks & services necessary for any Mission component.
16. No permanent construction and no permanent creation of posts except in case of VTU.
However, it would be possible to create posts in regular pay-scales purely on contract basis to attract best possible talent.
17. Faculty members willing to devote themselves full time for the project, can have their salary charged to the project.
18. Retired faculty members / experts could also be hired as experts for the project.
19. The Institution implementing the project, could, depending on the requirement and necessity, engage start-up companies existing on their campus.
20. Any other activity authorized by the National Committee for the furtherance of the objectives of this Mission.
21. Salary, up to 3 months, as a consulting fee can be charged to the research project.
22. Project activities for collaboration with international expertise may have been incurred in the past, which may be reimbursed from the project.
23. International co-operation from different partners for project activities may be funded so that the required deliverables are achieved in time.
24. International content generation and customization to our needs may be funded.
25. Joint proposals from international partners can be formulated to achieve research objectives of the Mission.
26. Proposals with the international partners can be formulated and clear cut responsibilities may be defined so that the funding pattern can be generated for the faculty and research staff.
27. Summer term support for students [national and international, visiting India or abroad] may be provided in case this manpower is working towards research objectives of the Mission.
28. Efforts to locate examine and extract relevant knowledge inputs from our ancient knowledge base.

29. Devising methods to at least reduce the ill-effects of internet so that distractions and pitfalls for the learners are avoided and web based learning approach is able to retain its sanctity and credibility.
30. Evolving psychological and personality tests with high confidence levels.
31. Any other activity approved by the Apex Board.

10 Eligibility Criteria for Institutions to be funded under the Mission

1. Central Govt institutions of excellence / national importance.
2. Central Universities
3. Central Govt research institutions
4. Central / State Govt institutions
5. Renowned institutions (whether in public or private sector) in the specific project area
6. Renowned NGOs
7. Any registered outfit established and managed by an eminent expert in a subject area, who may not be working in any of the institutions mentioned above.
8. Any other type of Institution approved by the Apex Board.

11 Submission of proposals

1. Initial proposals will be submitted online and will be circulated on the portal among various known experts who can provide their valuable inputs / comments on the proposal or appraise it apriori.
2. Once the initial proposal meets certain benchmarks, a revised, documented proposal will be submitted in print form with signatures on proposal and undertaking etc., and in electronic form with appropriate digital signatures.
3. The proposal, both initial and final, should contain the objective, justification & relevance, approach & methodology, time bound outcome based action plan with

PERT chart, stage / phase wise, activity wise and outcome wise requirement of funds, project staff requirements, proposed networking with other institutions to attain synergy and avoid duplication, facilities required from other institutions, administrative structure & norms adopted for various sub-activities, social cost benefit analysis of the proposal, list of experts who will be working on the project, their bio-data etc., list of experts who could be used for peer review of the quality and pace of work, current status of research in that area etc..

12 Screening of proposals

The project proposals would be first screened by the peer groups formed by the Domain Experts Committee for specific activities and after incorporating its suggestions, if any, they would be placed before the Empowered Experts Committee [to be known as Project Approval Board] for a final decision regarding approval and sanction.

13 Pattern & extent of assistance

Assistance for the projects under this Mission would be upto 100% of the estimated cost as assessed by the Domain Experts Committee and the Empowered Expert Committee [to be known as Project Approval Board]. Funds could be released either in one installment or in several installments as decided by the Empowered Experts Committee (to be known as Project Approval Board). Facilities created out of the assistance received under this Mission would be a national resource and would be sharable by other project implementing institutions / experts / students in that order of priority after fulfilling the main project requirements under the Mission, for which they were set up.

14 Release of grants

1. The start-up grant will be released immediately, after the sanction for the project is issued after obtaining the prescribed approvals. The start-up grant will not be more than 50% of the project cost.
2. The release of funds will be done electronically to the specified bank account.
3. After initial start-up grant, it would be outcome linked release and for the service providers, it would be in accordance with the Service Level Agreement.

15 Withholding of grants

The grants could be withheld if the peer review finds that the outcome based progress of the project is not satisfactory and / or the project is getting inordinately delayed so as to make it lose its relevance.

16 Disbursement conditions

1. Organization/NGOs/Societies not wholly or substantially funded by the Govt. of India shall have to sign and execute a bond “in advance” in the prescribed proforma (Annexure-I) in favour of Union Ministry of Human Resource Development. The bond should be submitted along with the original proposal.
2. In place of the Pre Stamped Receipt (PSR), the grantee body shall have to give “authorization letter for sending grants-in-aid, directly, into the bank account of the Organisation / NGOs/Societies etc. The authorization letter should be submitted along with the original proposal. A Format of the authorization letter is at Annexure-II.

3. The Status of the utilization of funds released earlier and the utilization certificates due shall be submitted by the grantee institution before the actual release of funds / installment.

17 Extension of the project

Due to unforeseen circumstances or due to enhancement of the scope of activity in the light of new experiences gained or research results obtained, it would be possible for the Empowered Committee of Experts (to be known as Project Approval Board) to grant extension to the specific project(s) on the basis of the recommendation of the Domain Expert Committee for that specific group of activity. This would, however, be done only under exceptional circumstances.

18 TERMS AND CONDITIONS

The following general conditions will be complied with by any institution / organization receiving assistance under the scheme –

- i. The institution / organization will maintain the account and get the final account / accounts for the year audited by Govt. auditors, in case of institutes whose accounts are audited by Govt. auditors or by a Chartered Accountant, as the case may be, and submit these in the original to the Ministry / State Level Monitoring Agency (SLMA), along with the utilization certificate on completion of the project or within 6 months from the close of the financial year, whichever is earlier.
- ii. The institution / organization will not accept or apply for any financial aid from any other source towards the projects approved under this scheme, except with prior approval of the Ministry.

- iii. The final progress report in respect of complete project should be sent along with the final audited accounts. Audited accounts should always be prepared item-wise, according to the sanction.
- iv. The grantee agency will be required to prepare quarterly progress report on the project or as prescribed and submit it to the Ministry / State Level Monitoring Agency (SLMA), along with a statement of expenditure actually incurred during the quarter. It will also be required to record a certificate to the effect that the expenditure has been incurred in accordance with sanctioned grant.
- v. Separate account will be kept of the project / seminar receipts and expenses even though some of the terms of expenditure may be common with those incurred by the institution in accordance with sanctioned grant.
- vi. The accounts of equipment etc. related to the projects for which assistance is received under this scheme will be made available for inspection by an officer authorized by the Ministry / State Level Monitoring Agency (SLMA). The accounts relating to the project shall be open to check also by the Comptroller and Auditor General of India or his nominees at his discretion.
- vii. The institution / organization shall prepare and maintain a record of all assets acquired wholly or substantially out of grants received under the scheme. Such assets shall not be disposed of, encumbered or utilized for other purpose without prior sanction of the Ministry.
- viii. The grantee agency will be required to complete the study and submit the final report to the Ministry / State Level Monitoring Agency (SLMA) within the stipulated duration of the projects.
- ix. The projects may be externally evaluated after completion by an agency nominated by the Ministry / State Level Monitoring Agency (SLMA)

- x. In the case of the grantee being private self financing educational institutions, the institution concerned shall give an affidavit, stating, *inter alia*, that it shall abide by all the terms and conditions laid down by the Mission for receiving assistance.
- xi. The grantee shall be liable to refund the entire grant amount together with damages & interest thereon @ 10% p. a. for any violation of the terms and conditions mentioned in the scheme / Govt. sanction from the date of encashment of the cheque / bank draft for the amount sanctioned for the project, provided that the Govt. in its discretion may relax the date for the purpose of calculation of interest to provide for such interest to be charged from a subsequent date.
- xii. The decision of the Secretary to the Government of India in the Ministry of HRD, Department of Higher Education or the Head of the Department administratively concerned with the matter on question whether there has been breach or violation of any of the terms and conditions mentioned in the sanction letter shall be final and binding on the grantee.

19 Calendar of events

The calendar of events shall be approved by apex board. The calendar would clearly indicate starting and end date along with the deliverable. The major milestones achieved would be mentioned, along with the name of the project and the institute.

20 Phasing of activities

Phasing and timelines would be worked out along with the project execution committee and project monitoring committee. Each project would have its timelines and PERT chart. There will also be integration at the end of each phase. The deliverable at end of phase after integration shall also be identified.

21 Monitoring & Supervision

There would be several committees to monitor and supervise the set of projects to ensure timely progress of the projects and the quality assurance of the outcome of the projects. Monitoring feedback from all the committees would be sent to a coordination committee so that appropriate decisions could be taken to make sure that the overall progress of the Mission in terms of objectives and deliverables is achieved. The project monitoring shall be carried along with the user group so that proper feedback for project investigators could be generated. It shall be the responsibility of these committees to make sure that the feedback provided by the users reaches in a format which could be implemented by project investigators. Such feedback can be generated every six months or earlier through conducting workshops.

22 Reports & returns

All principal investigators shall electronically submit / update the progress report every week. These reports shall be available on the mission website so that progress project outcomes are known to system integrators. System integrators can give their feedback to the project monitoring and supervisory committee and the project investigators through the website. Once a year, the whole community involved in the mission should meet so that thoughts can be exchanged to add value to project. Report of such workshops can also be uploaded to website. E-reporting system can be developed to provide scope for fruitful interaction among different stakeholders.

Such evaluation may take place twice during the project period, one for mid-term correction and one after final submission. The best projects delivered can be awarded. The format for final report can be prepared by the project evaluation committee. This committee would have members from user group, industry, and institutes amongst others.

23 Evaluation

Project evaluation criterion shall be developed by a group of experts so that the outcome of all the projects can be quantified. Even negative results would be encouraged for documentations so that repetition of some exercises can be avoided in the future. Final report can be evaluated nationally and internationally so that the quality of work can be evaluated at the highest possible standards. This group shall interact with the project development team so that clarity in thought process can be achieved.

There can be number evaluation committees to examine project details and possible outcomes of the projects. Since these outcomes are required to be integrated, this group of evaluation committees shall invite proposals or suggest institutes/individuals that would assist in achieving the mission goals.

The evaluation committees shall conduct workshops so that understanding of evaluation process and the needs of various projects are understood by various stakeholders.

24 Physical Activities, Financial Requirements and phasing

ANNEXURE - A

24.1 Financial Requirements and Phasing

**NATIONAL MISSION IN EDUCATION THROUGH INFORMATION
AND COMMUNICATION TECHNOLOGY (ICT)**

(Rs. In Crores)

ITEMS	Financial Projections * Phase-I	2008-09	2009-10	2010-11	2011-12
CONTENT GENERATION					
NPTEL phase II / III	96.00	10.00	20.00	20.00	46.00
PG Classes	100.00	10.00	20.00	20.00	50.00
UG Classes	100.00	10.00	20.00	20.00	50.00
NCERT for VI to XII & NIOS	0.00	0.00	0.00	0.00	0.00
Video content digitization, conversion, chunking and dubbing CEC / IGNOU / NCERT / SIET / OTHERS	50.00	5.00	10.00	10.00	25.00
Provision of e-books and e-journals free to the learners	100.00	20.00	40.00	40.00	0.00
Standardisation of quality assurance of contents & certification / automation of certification	95.00	10.00	20.00	20.00	45.00
Developing suitable pedagogical methods for various classes, intellectual calibers and research in e-learning	150.00	20.00	40.00	40.00	50.00

Development of language converter and translation tool kit	25.00	5.00	10.00	10.00	0.00
Development and realization of Virtual Reality Laboratories and supporting facilities for e-learning	200.00	20.00	40.00	40.00	100.00
Spread Digital Literacy for Teacher Empowerment 'A'	200.00	20.00	40.00	40.00	100.00
Development of Certification & Testing Modules for Virtual Technological Universities & creation of VTU, multi media research and international programmes	100.00	10.00	20.00	20.00	50.00
Experimentation and Development of ultra low cost access devices for wider coverage of learners & their field trials	25.00	10.00	15.00	0.00	0.00
Talk to a teacher to provide a substitute for coaching for the economically poor students	100.00	20.00	40.00	40.00	0.00
Development of software controlled hardware programming for robotics & other crucial areas	50.00	10.00	20.00	20.00	0.00
Adaptation & deployment of open source simulation packages equivalent to MATLAB, ORCAD etc.	50.00	10.00	20.00	20.00	0.00
Development of unified ERP system for Educational Institutions	20.00	5.00	10.00	5.00	0.00
Publicity & training of motivators & trainers to ensure full utilization of the systems by institutions & students. Teacher Empowerment 'B'	50.00	10.00	20.00	20.00	0.00
Conversion of available content in various regional languages	200.00	10.00	20.00	20.00	150.00
Development of Vocational Educational modules and use of haptic devices for education & training	100.00	15.00	30.00	30.00	25.00
Sub Total	1811.00	230.00	460.00	460.00	661.00
CONNECTIVITY					
Communication & bulk storage servers at 100 premier institutions	200.00	14.00	28.00	28.00	130.00

1 EduSAT teaching hub at each of the 100 Central Institutions / premier institutions	60.00	0.00	20.00	20.00	20.00
20 EduSAT Satellite Interactive Terminals at each of the 100 Central Institutions /premier institutions	12.00	0.00	5.00	5.00	2.00
2000 nodes for 1 Gbps connectivity at each of the 100 Central Institutions / premier institutions to be connected through BSNL Internet + VPN Plan	500.00	20.00	40.00	40.00	400.00
1 EduSAT Satellite Interactive Terminal at each of the 18000 Institutions of Higher Learning	108.00	0.00	30.00	30.00	48.00
15-20 nodes for 7.5-10 Mbps connectivity at each of the 18000 Institutions of Higher Learning connected through BSNL Internet + VPN Plan	1000.00	200.00	400.00	400.00	0.00
6 uplinking hubs for 6 National Beam transponders of EduSAT	24.00	0.00	10.00	10.00	4.00
Provision of 1000 DTH Channels for Eklavya & other video based programmes including IPTV for e-learning	120.00	20.00	40.00	40.00	20.00
Provision of 100 PC in 18000 Institutions of Higher Learning @ 1 per faculty member on 50:50 cost sharing	700.00	20.00	200.00	200.00	280.00
iPStar satellite access device @ \$250 per device for 100*300+18000*5 = 120000 terminals @ one tenth	12.00	0.00	5.00	5.00	2.00
Bandwidth charges for iPStar terminals 100cr + 200 cr + 200 cr + 100 cr + 50 cr till our satellite has 45 Gbps capacity @ one tenth	65.00	0.00	10.00	10.00	45.00

Sub Total	2801.00	274.00	788.00	788.00	951.00
Grand Total	4612.00	504.00	1243.00	1223.00	1612.00

*** 3% of the above mentioned costs would be utilized towards recurring administrative expenses with the approval of the Empowered Committee of Experts.**

ANNEXURE - B

24.2 Physical Targets and Phasing

ITEMS	Total Physical Projections *	1st Year %	2nd Year %	3rd Year %	4th Year %
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CONTENT GENERATION					
NPTEL phase II / III	Creation of 500 web and video courses in 15 disciplines; enabling streaming format for all video courses developed; web support services	10	20	20	50
PG Classes	50 disciplines; 32 papers per discipline	10	20	20	50

	(semester level); 1600 courses in all				
UG Classes	80 Subjects; 24 courses (semester level) per subject; 1920 courses in all	10	20	20	50
NCERT for VI to XII & NIOS		0.00	0.00	0.00	0.00
Video content digitization, conversion, chunking and dubbing CEC / IGNOU / NCERT / SIET / OTHERS	100,000 video programmes developed over a period of time to be digitised, re- purposed etc.	10	20	20	50
Provision of e-books and e-journals free to the learners	6000 e-books & 40000 e-journals	20	40	40	0
Standardisation of quality assurance of contents & certification / automation of certification	Development & Research activity	10	20	20	50
Developing suitable pedagogical methods for various classes, intellectual calibers	Research & knowledge dissemination activity	15	25	35	35

and research in e-learning					
Development of language converter and translation tool kit	Technology development & research activities	20	40	40	0
Development and realization of Virtual Reality Laboratories and supporting facilities for e-learning	100 virtual labs; each lab having at least 10 experiments	10	20	20	50
Spread Digital Literacy for Teacher Empowerment 'A'	All teachers in the Higher Education Institutions would be motivated and trained to use ICT tools effectively for imparting e-learning	10	20	20	50
Development of Certification & Testing Modules for Virtual Technological Universities & creation of VTU, multi media research and international	Development & Research activity and deployment in 5 VTUs and 100 universities	10	20	20	50

programmes					
Experimentation and Development of ultra low cost access devices for wider coverage of learners & their field trials	Research & Development activities	40	60	0	0
Talk to a teacher to provide a substitute for coaching for the economically poor students	60 Subjects; 10 chapters for each subject; 2 experts for each chapter; 24*7*365 for 5 years	20	40	40	0
Development of software controlled hardware programming for robotics & other crucial areas	Research & Development activities and Technology development	20	40	40	0
Adaptation & deployment of open source simulation packages equivalent to MATLAB, ORCAD etc.	Research & Development and Knowledge dissemination activities	20	40	40	0

Development of unified ERP system for Educational Institutions	Examination, Registration and Result declaration etc. Modules to be deployed in 100 premier institutions.	25	50	25	0
Publicity & training of motivators & trainers to ensure full utilization of the systems by institutions & students. Teacher Empowerment 'B'	100,000 teachers covering 600 districts	20	40	40	0
Conversion of available content in various regional languages	6000 e-courses and 100,000 video programmes into 15 languages	5	10	10	75
Development of Vocational Educational modules and use of haptic devices for education & training	1000 modules covering 100 disciplines	15	30	30	25
Sub Total					

CONNECTIVITY					
Communication & bulk storage servers at 100 premier institutions	100 sets of Communication & bulk storage servers	7	14	14	65
1 EduSAT teaching hub at each of the 100 Central Institutions / premier institutions	100 EduSAT hubs	0	30	35	35
20 EduSAT Satellite Interactive Terminals at each of the 100 Central Institutions /premier institutions	2000 SITs	0	40	40	20
2000 nodes for 1 Gbps connectivity at each of the 100 Central Institutions / premier institutions to be connected through BSNL Internet + VPN Plan	1 Gbps connectivity to 100 premier institutions	4	8	8	80
1 EduSAT Satellite Interactive Terminal at each of the 18000 Institutions of Higher Learning	18000 SITs	0	30	30	40

15-20 nodes for 7.5-10 Mbps connectivity at each of the 18000 Institutions of Higher Learning connected through BSNL Internet + VPN Plan	10 Mbps connectivity to 18000 Colleges	20	40	40	0
6 uplinking hubs for 6 National Beam transponders of EduSAT	36 uplinking hubs	0	40	40	20
Provision of 1000 DTH Channels for Eklavya & other video based programmes including IPTV for e-learning	1000 DTH Channels	20	30	30	20
Provision of 100 PC in 18000 Institutions of Higher Learning @ 1 per faculty member on 50:50 cost sharing	18 lac PCs	5	25	25	45
iPStar satellite access device @ \$250 per device for 100*300+18000*5 = 120000 terminals @	12000 Satellite terminals	0	40	40	20

one tenth					
Bandwidth charges for iPStar terminals 100cr + 200 cr + 200 cr + 100 cr + 50 cr till our satellite has 45 Gbps capacity @ one tenth	Satellite bandwidth charges gradually tapering off	0	15	15	70
Sub Total					
Grand Total					

ANNEXURE - I

(To be furnished on Rs.20/- Stamp Paper)

BOND

KNOW ALL MEN BY THESE PRESENTS THAT we the -----ABC -----
------(name of the organization as in
Registration Certificates) an association registered under the Societies Registration
Act, 1860 having been registered by the office of ----- (Name and full
address of Registering Authority), vide Registration Number ----- dated ---
---- office at -----in the State of ----- (herein after called the
obligor/obligors) are held and firmly bound to the President of India (hereinafter
called the Government) in the sum of Rs. -----(in words Rs-----
- only)with interest therein @ 10% per annum well and truly to be paid to the
President on demand and without demur, for which payment we bind ourselves
and our successors and assigns by these presents.

2. SIGNED this ----- day of ----- in the year Two thousand and -----.

3. WHEREAS the obligors has sent a request proposal to Government, through the Union Ministry of ----- for Grants of Rs.-----
Vide his Letter number -----Dated -----; the obligor has agreed to execute this bond in advance, in favor of Union Ministry of ----- for entire amount of Rs-----as requested in the proposal sent to the Government. The obligor is willing to accept the proposed amount or any other amount approved / sanctioned by the Government. The obligor is willingly executing this bond of proposed amount with the stipulation that obligor will be bond upto this amount or by the actual amount approved/ sanctioned by the Government, whichever is less. The obligor is also willing to accept all terms and conditions mentioned in the “Letter of Sanction” to be issued by the Government.

4, Now the condition of the above written obligation is such that if the obligors duly fulfill and comply with all the conditions mentioned in the letter of sanction, then above written bond or obligation shall be void and of no effect. But otherwise it shall remain in full force and virtue. If a part of the grant is left unspent after the expiry of the period within which it is required to be spent, the

obligors agree to refund the unspent balance along with interest at the rate of 10% (ten percent) per annum unless it is agreed by the sanctioning authority to be carried over to the next financial year. The amount of grant shall be refunded along with interest earned thereon.

5. The Society/Trust agrees and undertakes to surrender/pay to Government the monetary value of all such pecuniary or other benefits which it may receive or derive/have received or derived through/upon unauthorized use (such as letting out premises for adequate or less than adequate consideration or use of the premises for any purpose other than that for which the grant was intended) of the property/building or other assets created/acquired/constructed largely from out of Government grant. The decision of the Secretary to the Government of India in the Ministry of -----Department of----- or the administrative Head of the Department concerned shall be final and binding on the Society/Trust, in respect of all matter relating to the monetary value mentioned above to be surrendered/paid to the Government.

6- The member of the executive committee of the grantee will

- (a) abide by the conditions of the grants in aid by the target dates, specified in the letter of sanction and
- (b) not divert the grants or entrust execution of the scheme or work concerned to other institution (s) or organisation(s) ; and
- (c) abide by any other conditions specified in the agreement governing the grants in aid.

In the events of grantee failing to comply with the conditions or committing breach of the conditions of the bonds, the signatories to the bonds shall be jointly and severally liable to refund to the President of India, the whole or a part amount of the grant with interest @ 10% per annum thereon. The stamp duty for this bond shall be born by the Government.

7-AND THESE PRESENTS ALSO WITNESS THAT

- (i) The decision of the Secretary to the Government of India in the Ministry of ----- Department of----- on the question whether there has been breach or violation of any of the

terms and conditions mentioned in the sanction letter shall be final and binding on the obligors; and

- (ii) The Government shall bear the stamp duty payable on these presents.

In witness whereof these presents have been executed as under on behalf of the obligors and day herein above written in pursuance of the Resolution NO.----- Dated _____ passed by the Governing Body /Executive Committee of the obligors, a copy whereof is annexed hereto as Annexure B,.

()

Signed for an on behalf of

Signature of the grantee.

(Name of the Obligor Association, as registered.)

Full Mailing Address-----

Telephone Number/ Mobile NO. -----

E mail address (if available)

Fax Number:

(in the presence of) Witness name, address and signature

(i)

(ii)

(Sign)

Accepted for an on behalf of the
President of India

Designation

Date

Name & Address

ANNEXURE - II

Authorisation Letter for sending Grants –in – aid /funds through e-payment directly into the Bank Accounts of the organization.

I /WE -----(name of the entity /Society/ organization)

Would like to receive the grants in aid disbursed by the , Union Ministry of -----directly into the bank Account of the society/ institution/ organisation etc. through electronic mode of transfer .The particular are as under

- 1.Name of the payee (as in the bank accounts)
- 2.Name of the Bank---
- 3.Bank Branch (full address) -----State -----District-----Pin-----
4. Branch Code number
5. Bank Account Number -----(in words-----)
- 6.Type of bank Account---Saving/ Current
- 7.MI CR code of the Bank-----
- 8.Mode of Electronic transfer Available in the Bank -ECS/RTGS/NEFT /CBS/code number (if any);-

Place: New Delhi

Signature of grantee

Date: -----

Name of Grantee:

Designation/ Rubber stamp

Full Address of the institute/NGO/Society (village / sub division/ district/

Pin/ state)

Telephone number/ Fax number/Mobile number----

Email (if any)