

Draft Concept Paper

Conceptualization of Phase-II of EICT Academies

1. Introduction

For long, there has been a focus on ESDM & IT, metamorphizing into "Atm-Nirbhar Bharat" and "Digital India" for ESDM/IT domains. Human resources development to serve these missions is a crucial requirement for taking ahead these objectives and mission.

In the past, EICT Academies have achieved many goals envisaged in that phase.

Academies have gained the following strengths through their efforts during phase I.

- At each of the academies, we have identified a set of experts/speakers from IITs/NITs/IIITs/industries in respective areas; present academies can handhold tier-2/tier-3 institutions for further spreading the umbrella of FDPs, enabling them to host such programmes in their locality.
- Each of the academies has amassed many resources- recorded lectures, relations with experts, lab infrastructure, reach to faculty who worked as coordinators or attended as participants. Academies have contacts with several faculty in other HEIs who were coordinators/participants;
- Our assessment/certification benchmarks have matured- Attendance, quizzes, assignments, hands-on; the process of assessment/certification is similar across all academies, especially it is uniform for jointly organized (global) FDPs. Our collaboration & efforts for joint programmes have matured.
- Of various FDPs, already conducted in emerging/niche areas, several were led by speakers from industries. Academies have also offered FDPs on technology support for teaching, learning attracting faculty from diverse disciplines.
- Until now, the offered FDPs have attracted participants with sincere intention, whereas the assessment/certification process has ensured that good performance is rewarded.
- With the ministry's help, we now have a reach to UGC/AICTE and state administration and affiliated colleges. Further, Academies efforts need to be endorsed by these bodies by approving FDPs for promotions and equivalent to pre-requisite courses for PhD.
- Self-paced programmes- we can leverage a repository of lectures delivered in live e-programmes



(Prof. Vineet Sahula, MNITJ)
Convener cum Member Secretary, Sub-committee of CIs
& Chief-Investigator, EICT Academy MNIT Jaipur

- IIT Kanpur has developed a platform for self-paced programmes to serve multiple purposes- content hosting, user management, assessment/progress tracking, and accounting. Other academies have gained experience conducting live online programmes through a professional version of video conferencing platform & utilizing an available version of open-source LMS- either multicasting to remote centres or an individual participant. Before this, we exploited video conferencing hardware setup at each of our institutes to connect through the NKN backbone and connecting successfully to many spoke-centre with massive participation.

Following opportunities exists for academies.

- The online mode of education would now co-exist with mainstream and would be there post-Covid-19 too.
- Outreach to faculty of tier-2/tier-3 institutions & HEIs
- Interaction with industries to understand the real-life problems
- The faculty of other HEIs may be the catalyst to spread the reach of FDPs, in the hub-n-spoke model
- Continuation with more stress on the pedagogy of technology and provide enhanced research orientation to faculty
- Continuation with FDPs on technology support for teaching, learning; conduct workshops on issues in emerging areas
- The Academies have arrived at a certain standard procedure for certification.
- Sharing of resources amongst academies
- Synergy with efforts of programmes under GIAN, PMMMNMTT, NPTEL

The challenges existing/faced earlier by academies are as follows.

- The target number for in-person mode programmes to be decided more realistically & rationalized
- The number of trained faculty in e-mode, whether synchronous or asynchronous, is usually much larger than the number for in-person mode vis a vis financial implication.
- With FDPs offered by other agencies- ATAL, PMMMNMTT, GIAN; we have difficulty attracting more extensive participation now.
- Insufficiency of finances/grants have to be supplemented by the respective academy's revenue.
- Academies need formal support/acknowledgement from the higher education commission, AICTE/UGC, for the benefit to be extended to



(Prof. Vineet Sahula, MNITJ)
Convener cum Member Secretary, Sub-committee of CIs
& Chief-Investigator, EICT Academy MNIT Jaipur

participants in institutions under the aegis of these bodies (for faculty working in Electronics & IT/ITes fields)

2. Need/Rationale for phase-II

- The country economic growth & defence needs are technology-driven; especially, support of electronics & computer technologies is crucial.
- Our country has a large number & vast base of engineering/technology institutes, students & faculty.
- Our country needs to reinforce software human resources capacity building and the continuation of the policy of motivating serious efforts for Electronic and semiconductor manufacturing.

3. Goals/Objectives for next phase

- The more comprehensive and pan-India proliferation of FDPs with coordinating efforts from motivated faculty of tier-2/tier-3 institutes & HEIs and making them capable, innovative and research-oriented
- Preparedness of stakeholders for being technology ready- training in state of the art, emerging areas & industry-specific areas
- Conceptualize a cloud platform for content management, assessment & certification, participants record management, accounting/finances, CPS (cyber-physical systems enabled); also facilitate content creation by faculty & integration of other platforms, e.g. virtual labs. These would allow hosting online self-paced and online live programmes apart from enabling contents support to classroom programmes.
- Create and deploy a framework for self-assessment of activities by principal academics, based on measuring stated outcomes and on achieving benchmarks

4. Methodology/Action Plan to achieve goals

- (a) Leverage the 7 E&ICT Academies for the broader proliferation of FDPs and PAN-India coverage, including Faculty/ Teachers/ Mentors/ Professor of Practice, in Higher Education Institutions (HEI).
 - (i). Continue with in-person programmes supplemented by online live and self-paced programmes for continued engagement with faculty of tier-2/tier-3 institutions & HEIs.
 - (ii). Telescopic Mentor development/training: Training the trainers programmes in IEP (Instruction enhance programme) mode with the methodology of "How to teach" for faculty of HEIs; we could



(Prof. Vineet Sahula, MNITJ)
Convener cum Member Secretary, Sub-committee of CIs
& Chief-Investigator, EICT Academy MNIT Jaipur

- primarily focus on University curriculum of the tier-2/tier-3 institute for specific basic/core subjects or topics
- (iii). Offer workshops for mentee-coordinators on how to conduct a training programme effectively.
 - (iv). Continued engagement with faculty being mentored; Engaging them to have feedback from their own teaching experience
 - (v). Giving her/him the opportunity to act as a speaker (who have proven their aptitude)
 - (vi). Academy at IIT Kanpur has developed a platform for hosting self-paced programmes. Their inputs are attached in Annexure-II.
- (b) Targeted FDPs in niche/state-of-the-art technological areas, considering future-of-work and integration of industry-specific requirements in academics.
- (i). Continue offering programmes in niche/emerging areas.
 - (ii). Programmes for working professionals- certificate, diploma, degree; adhoc as well as regular-degree programmes
 - (iii). Designing programmes for mid-career professionals
 - (iv). Skill development and entrepreneurship development programmes for recent graduates with cognizance of industry requirements
 - (v). Engaging medium and small scale industries for their training requirements, skill upgradation
 - (vi). An indicative list is provided in Annexure-I.
- (c) Emphasis on Motivated, Energized, and Capable Faculty to ensure that teaching, research, and service in Universities/ HEIs remains at the desired level.
- (i). Support to PhD research at other institutes- offering equivalent courses satisfying credit requirements (tailored FDPs, equivalent to 3 credits on relevant topics); Faculty at Academies may offer joint supervision, be part of department research committees. Academies may create an academic bank of credits to facilitate these faculty to complete postgraduate/PhD programmes.
 - (ii). Motivated faculty at other institutes may be invited as doctoral and post-doctoral candidates at their respective institutions by Academies.
 - (iii). Enhanced interaction with industries- exposure to real-life problems, an industry consultancy, joint research/patents
- (d) Considering that NEP 2020 provides freedom to faculty to design their own curricular and pedagogical approaches within the approved framework, including textbook and reading material selections, assignments, and assessments; the FDPs may also focus on empowering the faculty to conduct innovative teaching, research, and service as they see best, which



will be a crucial motivator and enabler for them to do truly outstanding, creative work.

- (i). Mode of programmes to be more on IEP – Instruction Enhancement Programme mode covering pedagogical aspects, i.e. training on "how to teach a course."
 - (ii). Encouraging and supporting the faculty to offer the programmes in vernacular languages; programmes on an amalgamation of specializations- Arts & computers, Law & Engineering, commerce & blockchain.
- (e) Considering that Covid-19 has caused disruptions for colleges/ universities and courses are being delivered online to maintain continuity in teaching, there may be a need for adequate training of Faculties in applying the use of technology to teaching, developing e-learning activities, etc.
- (i). Sensitizing them and helping them in developing infrastructure for online education
 - (ii). Academies would continue offering FDPs on ICT for teaching, learning, and like courses more frequently.
 - (iii). Increased focus on Hands-on; stress on the usage of open source tools, e-labs.
- (f) Standardization of FDPs, including assessment/ certification etc., across the E&ICT Academies, including the spoke institutions.
- (i). Academies may engage with ISO, BIS and QCI like agencies and Sector Skills councils- Electronics (ESSC), Telecomm (TSSC) etc.
 - (ii). Other professional bodies endorsement may be an option- like from IEEE, IETE, IESA, IE(I) etc.
- (g) Sharing of Online infrastructure facilities across academies for maximum utilization of resources, including recorded videos, smart classrooms, virtual Labs.
- (i). Sharing amongst Academies is always desired to optimize the usage of facilities; Academies have developed various diverse facilities; IIT Kanpur has developed a platform that is more than a content management platform.
 - (ii). Envisioning & developing a national platform for hosting Open Educational Resources (OER) in the domain of Electronics & ICT
 - (iii). Handholding with existing companies offering e-platforms like EDX, Coursera, NPTEL and SWAYAM
- (h) Synergizing joint efforts with other FDP programmes by Central & State level agencies, such as ARPIT, NITTTR, NMEICT, RUSA, PMMMNMTT, DIKSHA etc.



(Prof. Vineet Sahula, MNITJ)
Convener cum Member Secretary, Sub-committee of CIs
& Chief-Investigator, EICT Academy MNIT Jaipur

- (i). A consortium of Educational Communication (CEC), GIAN, NPTEL, e-Yantra, Virtual Labs, Spoken Tutorials (IITB), etc and should leverage their resources.
- (ii). Academies may focus on relevant areas which are supplemental to areas covered by other programmes like PMMMNMTT, ARPIT, NPTEL.
- (i) Defining clear-cut outcomes, including the yardsticks and benchmarks to measure these outcomes.
 - (i). The proposal is discussed in the next section. Outcomes could be defined. However, benchmarks could help in the evaluation of outcomes in the short term or long term.
- (j) Preparedness for being technology ready.
 - (i). Technology awareness workshops for senior school students, junior year engineering graduates
 - (ii). Elementary programmes on using technology for government officials/administrators for applying into their daily work life.

5. Outcomes/Deliverables

- Capable faculty in other HEIs (long term)
- Frequency of Curriculum revision & updated schemes in institution of mentees
- Quality and number of internships & Placement of students of mentee-teachers in the specific areas
- Enhanced activities of mentee faculty for outreach- offering Training programmes in the specific fields, publications, patents, technology transfer and innovation in teaching/learning/lab-development
- Efforts for higher studies, entrepreneurship by students of mentee-faculty



Annexure-I

Emerging areas/Industry-specific areas

Emerging areas covered so far by Academies while offering FDPs-

- Embedded Systems, Internet of Things (IoT),
- Machine Learning (ML), Artificial Intelligence (AI), Data Science
- 3D Printing
- Robotics, Autonomous vehicles, Smart Grids
- Quantum Computing, cyber security
- Chip design, fabless design flows; Processor (RISC/CISC) design; Chips for 5G/6G, SoC design & verification

Areas that could additionally be focussed on (not limited to)-

- Augmented Reality (AR)/Virtual Reality (VR)
- Medical Electronics, Drone- Unmanned Aerial Systems (UAS) or remotely piloted aircraft systems (RPAS)
- AutoCAD, Smart Buildings, Geographical Information Systems
- Exascale computing



(Prof. Vineet Sahula, MNITJ)
**Convener cum Member Secretary, Sub-committee of CIs
& Chief-Investigator, EICT Academy MNIT Jaipur**

Annexure-II

Inputs from Academy at IIT Kanpur



(Prof. Vineet Sahula, MNITJ)
**Convener cum Member Secretary, Sub-committee of CIs
& Chief-Investigator, EICT Academy MNIT Jaipur**

Draft Notes on Concept Paper to explore the conceptualization of Phase – II of the E&ICTA Scheme

- Leverage the 7 E&ICT Academies for wider proliferation of FDPs, especially in tier-2/ tier-3 colleges in the country
 - PAAS Implementation for all interested colleges, with content mirrored on the local servers customised to their need, regular augmentation and updation of content with changes in tech space
 - Identifying and permitting good Faculty to develop and share courses on the platform in modular form with a royalty based system.
 - Allowing selected Faculty locally to run training workshops within their region with support from the hub academy in terms of resources, platform access etc.
- Targeted FDPs in niche/ state-of-the art (SOTA) technological areas, considering future-of-work and integration of industry specific requirements in academics.
 - Small Modules to be designed with access to cyber physical systems to augment the learning in SOTA technological areas
 - Guiding and handholding faculty in these institutions for joint projects and research in these advanced areas
- PAN-India coverage in hub-n-spoke mode for deeper proliferation, including inclusion of Faculty/ Teachers/ Mentors/ Professor of Practice, etc. in Higher Education Institutions (HEI).
 - Each EICT academy should replicate their delivery platforms and augment delivery through a PAN global faculty identified and onboarded.
 - These faculty may be requested to design and/or share their existing course modules including ppt's /videos/MOOC's, which can be shared with targeted faculty members
 - Regional Language delivery capacity may also be augmented for the benefit of both faculty and students in this institutes
 - Faculty leaders in these institutions identified and all support to be provided by the nodal academy to facilitate their delivery with a continuous and dynamis engagement model
 - Resources include but not limited to, software, cloud access, virtual class rooms, pedagogy, audio/video clips, ppt's, open source resources etc
 - Faculty may be provided some subsidization in registering for eMasters programs of the nodal academy's parent institute
- Emphasis on Motivated, Energized, and Capable Faculty to ensure that teaching, research, and service in Universities/ HEIs remains at the desired level.
 - Faculty may be invited to join as Post Doctoral Fellows and PhD programs of the nodal academies both in regular and distant mode
 - Faculty may be invited to collaborate on Short Term Industry Assignments
- Considering that NEP, 2020 provides freedom to Faculty to design their own curricular and pedagogical approaches within the approved framework, including textbook and reading material selections, assignments, and assessments, therefore FDPs may also focus on empowering the faculty to conduct innovative teaching, research, and service as they see best, which will be a key motivator and enabler for them to do truly outstanding, creative work.
 - Regular modules on Innovations in Teaching should be designed and delivered

- Workshops/Colloquia/Seminars/Conferences where faculty can share their teaching innovations on a regular basis and compare notes with their colleagues
- Repository of teaching innovations and delivery should be created
- Develop courses of “How to teach X” instead of a course on “X” itself.
- Help the faculty motivate a topic, create assignments, hands-on and share
- Collate them into a resource bank for access to all faculty
- Development of DIY kits for experiments
- Considering that Covid-19 has caused disruptions for colleges/ universities and courses are being delivered in online mode to maintain continuity in teaching, there may be a need for adequate training of Faculties in applying the use of technology to teaching, developing e-learning activities, etc.
 - COVID-19 can not be on the long term agenda, however development of infrastructure is necessary as it provides flexibility for participants to attend the courses from their hometown.
 - Classroom (offline) for hands-on lab courses.
 - Creation of Cyber Physical systems for real life experience
 - Create study centres at major locations.
 - Subsidised access to eMasters and other short-term courses
- Standardization of FDPs including assessment/ certification etc across the E&ICT Academies, including the spoke institutions.
 - Best practices in this regard from all academies may be collated and shared
 - A discussion in this regard by all academies to arrive at a assessment/certification framework should be facilitated
- Defining clear-cut outcomes, including the yardsticks and benchmarks to measure these outcomes.
 - Develop a detailed weekly schedule.
 - Continuous evaluation using quizzes
 - End of course exam
 - Completion Certificate only for successful candidates, participation for others (Or graded evaluation excellent, good, satisfactory, *no certificate*)
- Sharing of Online infrastructure facilities across academies for maximum utilization of resources, including recorded videos, smart classrooms, virtual Labs etc.
 - Developing virtual labs is needed. Also, create videos to explain installation, usage etc. Intelligent systems for automated evaluation, feedback, and grading.
- Synergizing common efforts with other FDP programmes by Central & State level agencies, such as ARPIT, NITTTR, NMEICT, RUSA, PMMMNMTT, DIKSHA etc.
 - Development of a dedicated Faculty Engagement portal on the lines of WikiPedia
 - FDP’s
 - Workshops
 - Resource Sharing etc
 - All academies video content from their delivery may be edited, augmented and uploaded on a portal similar to edx platform.
 - Faculty should be allowed to upload their content on the portal under the CC license
 - Revenue sharing model to be put in place if the content is used for paid courses