Training of Polytechnic Teachers through Blended Technologies: A-VIEW and MOODLE Web Based Technologies in the Western Zone of India

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Abstract
India has a large technical education system comprising of engineering colleges and polytechnics. Quality of education depends upon quality of teachers in any system. Therefore, Government of India has decided to launch a special mission on teacher-training. National Institutes of Technical Teachers' Training and Research (NITTTRs) have been working to improve quality of technical education in India. To take up this challenge of training about 80,000 teachers of polytechnics, NITTTRs have decided to use ICT based training using A-VIEW -A Versatile E-learning Tool for distance education using ICT. This paper describes NITTTR Bhopal's experience in conducting teacher training using blended technologies; A-VIEW and MOODLE Learning Management System. The experience suggests evolving new pedagogy more suitable for ICT programmes, incorporation of newer teaching methods, and sorting out of infrastructural bottlenecks.

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1. Background

There has been explosive growth in Engineering Education and Polytechnic Education in India since independence and especially in last two decades. Number of engineering colleges has grown five fold in last two decades. Similarly, number of polytechnics providing technician education in different disciplines is about 3700 [1]. It is estimated there are about 80,000 untrained teachers in these polytechnics. Ministry of Human Resource Development (MHRD), Govt. of India has given priority to train these teachers through four National Institute of Technical Teachers' Training and Research, serving the four regions of the country. National Institutes of Technical Teachers Training and Research (NITTTRs) are autonomous institutes under the Ministry of Human Resource Development, Government of India. They are dedicated to quality improvement of technical education system in the country. Institutes offer short term teacher training and long term regular programmes in pedagogy/ andragogy, and in content areas of various engineering, science and management disciplines. Each NITTTR trains about 3-4 thousand teachers every year through contact mode.

Development in India is undertaken through Five-Year Plans. Approach paper [2] to the Twelfth Five Year Plan (2012-17) states that "Pre-service and in-service teachers training has to be mounted on mission mode in the Twelfth Plan for which information and Communication Technology could be effectively leveraged" (Planning Commission of India). Blended mode of teaching/learning using ICT is considered effective strategy to reach out to larger population of technical teachers. As large number of teachers are to be trained, it was thought to use technology enabled learning to be used for the same. Contact mode training requires larger capacity to reach out to the teacher population in shorter span, and is difficult to create. ICT enabled blended teaching/learning is considered a viable alternative to address this issue. Therefore, it was decided to use **A-VIEW- The Versatile E-Learning Tool for Distance Education** developed by Amrita University, IIT Mumbai with the help of Ministry of Human Resource Development, Government of India.

2. Polytechnic Teacher Training in the Western region: Magnitude

NITTTR Bhopal trains technical teachers of western region consisting of states of Madhya Pradesh, Chhattisgarh, Maharashtra, Gujarat and Goa and union territories of Dadra and Nagar Haveli and Daman & Diu.

In all there are 901 polytechnics in the Western Region of the country. State wise number of Polytechnics is given below for the western region [3].

i). Madhya Pradesh	:	63nos.
ii). Chhattisgarh	:	42nos.
iii). Gujarat	:	125nos.
iv). Maharashtra	:	659nos.

v). Goa : 10nos.
vi). Daman and Diu : 1no.
vii). Dadra and Nagar Haveli : 1no.

As the target of training of number of polytechnic teachers is about 80,000 for whole country. Target for west region is training 18000 teachers of polytechnics. So in the next year (2013-14), NITTTR, Bhopal is planning to train 15000 teachers of these polytechnics through ICT mode using blended technologies. This is besides the annual training capacity of about 3000 teachers being trained through already scheduled contact mode programmes, being offered at NITTTR, Bhopal and at its four Extension Centres. Accordingly, the institute proposes to train technical teachers through A-VIEW/ICT enabled teaching/learning in project mode though a setup of remote centre (lead polytechnics) network of say 20 to 25 clusters in the western region of the country. As a pilot project nine programmes were offered in the year 2012-13. Next few pages describe the experience of the institute with ICT programmes, content offered, technologies used and so on.

3. Faculty Development Training Programmes: Offered

NITTTR, Bhopal offered nine 'Faculty Development Training Programmes (FDTP)' during the academic year 2012-13. In all 564 teachers of the region were trained through ICT/AVIEW based online programmes, out of which eight were 'Induction Programmes' which were offered to 522 nos. of newly recruited teachers and one programme was on 'Research Methodology'. We will discuss about Induction Programme here.

The **Induction Programme** aims at developing basic teaching skills among the newly recruited technical teachers of engineering education system. At the same time this programme also aims at developing professionalism in the practicing teachers including right values and desirable attitudes which enable them to perform the roles and responsibilities expected of them by the institutions effectively.

In view of the above, the programme has been designed and developed in two phases each of 02 weeks durations. The online teaching and learning process was delivered/administered incorporating online structured syndicate tasks/group/individual assignments to accomplish competencies by the teacher.

I. Induction Programme Phase – I [4]

The Induction programme Phase-I, is intended to create awareness among the newly recruited practicing teachers about the Technical Education System in India and develop basic core skills, essential in classroom teaching. The teachers joining the Engineering Education System are bound to accept the multi-dimensional roles and responsibilities, of which the teaching would be the main component. The main objectives achieved during the programme were as follows:

Objectives:

The trainees were able to:

- appreciate the concept of technical and technician education system in Indian context
- know the roles and responsibilities of technical teachers in engineering education system
- understand and apply systems approach to class room instruction
- understand the concepts of curriculum and syllabus
- understand the concepts and principles of learning, instruction and learning styles
- comprehend the concept of content analysis and analyze the given content for identified topic
- formulate instructional objectives of different domains of learning and their taxonomy
- understand concepts and principles related to classroom communication
- appreciate and use different methods and techniques of teaching
- comprehend the formative and summative evaluation of students' learning
- understand the concepts of guidance and counselling
- understand organization of an industrial visit
- understand planning, designing and assessment of laboratory and project work
- prepare and use an appropriate media for class room instruction and
- prepare and deliver instructional session plans for a given time duration on a topic identified

Contents

- Role and responsibilities of technical teachers
- Learning and instruction
- Content analysis
- Instructional Objectives
- Classroom Communication
- Overview of Teaching Methods
- Overview of Instructional media including preparation of simple media
- Student evaluation
- Instructional session planning
- Teaching practice with feedback

II. Induction Programme Phase-II [5]

The Induction Programme Phase-II is designed and offered only to those teachers who have already attended Phase-I. The Programme aims at developing requisite advanced knowledge and skills related to aspects of Educational Technology. This enables the practicing teacher to resolve various educational problems encountered by them, through implementing the course work developed during Induction Training Phase-I. The main objectives achieved during the programme were as follows:

Objectives:

The trainees were able to:

- understand the concept of curriculum as opposed to syllabus
- comprehend the process of design and development of curricula for Engineering Education programmes including curriculum analysis
- appreciate and use advanced teaching methods and techniques

- appreciate the philosophy of laboratory instruction
- design, develop innovative laboratory experiences
- design and develop items/questions as per specification table prepared
- prepare an Action Plan to implement the experience learning and
- prepare and present a Mini Project of integrating the overall experience of work performance

Contents

- Design, development, implementation and evaluation of curriculum
- Teaching methods such as case study, role play, project method, industrial visit/training, etc.
- Student assessment including pen-paper tests and others
- Laboratory assessment
- Use of IT in teaching-learning
- Development of Power Point Presentation
- Mini-project

4. TRAINING METHODOLOGY

In the past, training was conducted through video conferencing (analog) having one way-video and two-way audio. However, it did not elicit proper response and was gradually abandoned. Therefore, a new approach using multimedia capabilities of A-VIEW as well as using MOODLE as Learning Management System was thought of and is being described below.

A blended learning approach [6] to training was implemented proposed in which A-VIEW (Amrita Virtual Interactive Elearning World) [7] based sessions were conducted by tutors through video-conferencing setup from NITTTR, Bhopal hub, which will be received at Remote Centres (RC)/Polytechnics. Each RC is a lead polytechnic with in a cluster of neighbouring polytechnics falling with in distance of say 150-200 km. Teacher trainees of all polytechnics in a cluster, who register for a particular course, are required to travel to the RC for A-VIEW based interactive sessions. Initially training capacity of 30 teachers per RC was thought of. However, participating RCs varied from 5 to 45 participants. In addition to the A-VIEW, in parallel a Web based Learning Management System using the MOODLE Learning Management System(LMS) [8]was also setup to register the course participants, host course content in lesson format for each session, Tutor and peer interactions, and to administer online tests and quizzes.

In order to ensure learning and track the progress of instruction, the LMS was used. The trainees were encouraged for self-learning going through the materials and reflecting on the assignments; after providing expert lecture on every topic through A-VIEW. The trainees were expected to work and submit ten assignments. Involvement of participants at every successive stage of the assignments and programme activities gave pleasure of experiential

learning. It also helped each individual to integrate the overall learning by way of completing assignment one after another leading to completion of Mini-Project. This added feature of the Phase-II provides them a unique experience and assists to inculcate desirable work attitudes towards teaching as profession.

4.1 Instructional Strategies

The blended technology based learning [9] approach has led to delivery of expert lecture through A-VIEW and simultaneously managing and administering learning through MOODLE LMS. Topic and content were identified. Instruction plan was development for teaching in blended delivery mode. The tutors identified the content to be engaged live using A-VIEW and part of the content to be delivered in self-learning mode through MOODLE LMS. Infrastructure for ICT/AVIEW and MOODLE LMS based online programmes was Setup.

I. The instructional strategy adopted in the A-VIEW E-Class Room
   - Generate Tutor IDs / setting rights as teacher for the tutors, workshop coordinators, and resource persons on A-VIEW course servers
   - Convert of lesson/ session contents in A-VIEW compatible structure and digital formats
   - Upload Content in A-VIEW servers, in order/sequence as per plan
   - Deliver engaging classes live and recorded
   - Provide access to lectures at varying bandwidths
   - Interact with Multiple teacher and student interaction through video and chat sessions
   - Share any kind of course content file and even on desktop
   - Share and discuss assignment submitted and providing feedback to trainees online at RC's at different locations
   - Interact with trainees through whiteboard and chat sessions
   - Use Handraise option for trainees to interact with teacher

II. The instructional strategy adopted in Learning Management System
   - Design and Prepare course material, pre-test, post-test, lessons, quizzes, assignments, cases etc in compatible digital format.
   - Generate Tutor IDs / setting rights as teacher for the tutors, workshop coordinators, and resource persons on MOODLE course server
   - Register/Enroll participants on course server using MOODLE LMS.
   - Launch Programme as per schedule.
   - Interact with trainees through instant messaging tools, engaging in a chat session and clearing their doubts through online discussion forums.
   - Provide online feedback to the assignments submitted by the trainees and tracking progress

- Administered and managed of the course as per schedule

5. Infrastructure Required at RCs [10]

It should be well equipped to conduct the workshop through the internet, for a minimum of 30 participants. The lectures are transmitted using the AVIEW software which will require the equipment and bandwidth as follows:

A-VIEW Hardware Requirements

Internet Bandwidth: Minimum 1Mbps broadband stable connection with public IP (2mbps recommended). At the time of workshop, RC will need stable 1Mbps internet connection with 512kbps download bandwidth and 256 kbps upload bandwidth (minimum).

- One Personal Computer with minimum 1GB RAM
- One Video Camera/Handycam with tripod (**Webcam is not acceptable**)
- To connect video camera to PC (any one of the following)
  - USB Video Capture Device or
  - USB/PCI IEEE1394 Firewire Card (if Video Camera/Handycam has Firewire out)
- At least one Professional wired or wireless mike/microphone (headphones or podium mike will not work efficiently for a large audience)

- One audio amplifier
- Two Speakers
- Cables and connectors according to your mike/microphone and audio amplifier's model. At least two cables will be required i.e. 3.5mm stereo to RCA (2) and other cables may be different because of different equipment models.

Classroom and LABS

- A large classroom with the following facilities, for a minimum of 30 participants, these systems should be connected through LAN and having Internet connection with min. 256 kbps sustained bandwidth.

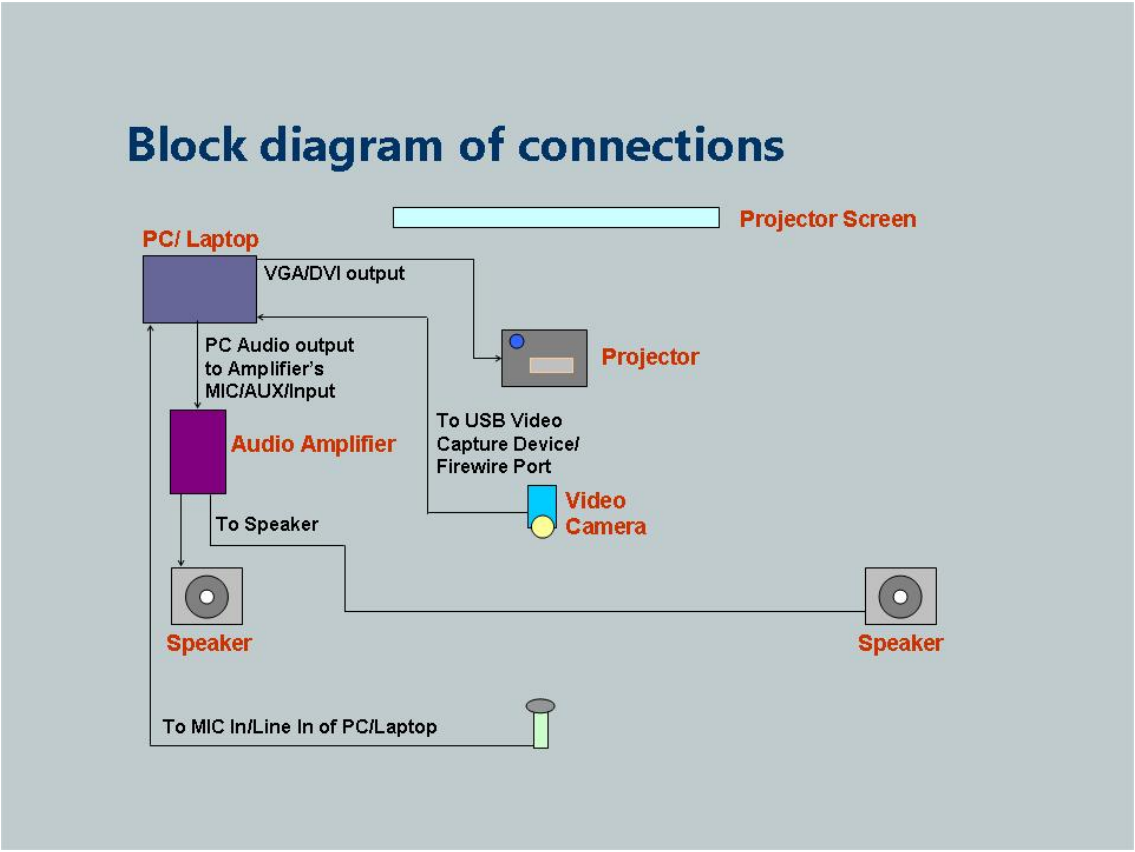
  - Overhead projector with large screen connected to a PC video camera (min. handy cam), audio equipment. (At least 1 professional wired/wireless mike **USB**
  - UPS to sustain PC/Projector.
- A laboratory for conducting experiments for a given subject, with a minimum capacity of 30 (subject wise details will be furnished in Coordinators' workshop)

Resource Persons Requirements

- In addition to the workshop coordinator the institute should also appoint a faculty member to be the coordinator for the remote centre, to be in charge of

(a) Class room arrangements, audio visual equipments handling, and coordination of all operation for smooth conduct of interactive sessions.
(b) Logistics arrangements and supervision of lodging /boarding of participants.
(c) Handling of final accounts.

Fig.1 Block diagram for A-View Setup



Infrastructure/ facilities utilized at NITTTR, Bhopal

- A dedicated webcast studio with A-VIEW/ICT hub/workstation to telecast course content with high sped dedicated leased line connection is in place at teaching end.
- Creation of content in A-VIEW and Moodle compatible format as per the proposed courses is developed.
- A sever dully configured with Learning Management System for offering blended learning mode has been setup.

5. Output so far (in about 8 months of operation)

First training programme of two week duration on a pilot basis was launched in June 2012. Based on the feedback of participants, faculty concerned, coordinators and resource persons, changes were incorporated in the design of the programme. Subsequently, 7

more programmes of two week duration training 522 teachers were conducted involving 11nos. of Remote Centres (RC). Operational details for conducting programmes were also finalized and duly notified to RCs.

6. **Findings**

At present no formal research on the implementation of programmes, issues, impact has been carried out, however, qualitative impressions that emerges out on talking to different holders such as participants, course coordinators, lectures, resource persons are given below:

- Almost everyone concerned with the training is thrilled with the new mode of training, where they do not have to go to large distances for conducting or receiving training. However, as with any new technology there is reluctance to accept new blended mode of learning as replacement of face-to-face training programmes by the participants of training programmes.
- There are large number of tools are available on A-VIEW platform to facilitate teaching-learning process. Faculty conducting the training programmes have utilized these tools and are appreciative of vast potential of these tools in enhancing teaching-learning effectiveness. However, traditional two-way interaction of face-to-face training, especially of rhetorical questions and actual presence of trainer rather than screen presence of trainers is somehow missed and is difficult to replace.
- As the number of participants, becomes large, it becomes cumbersome to timely correct assignments and provide feedback. However, this issue can be sorted by assigning more number of faculty programmes to correct assignments and feedback.
- Some teaching methods work especially well with ICT based training, such as lectures and assignments and these are extensively used for conducting training programmes.
- Some of more interactive methods such as role play, case study, and group assignments with presentations, teaching-practice have limited applicability to such training programmes.
- There is almost consensus that new pedagogy needs to be developed to utilize new dimensions of training as provided by ICT. At the same time some replacement of time-tested continuous two way interaction need to be thought of.
- Infrastructural bottle-necks remain impediment in the effective implementation of these programmes.
- Bandwidth remains a major impediment, especially polytechnics located in rural areas. Average broadband speed in India is about 0.9 Mbps which is way below global average.
- Many a time, disruption due to power cut, also poses problem in rural polytechnics. However, one feature of A-VIEW that lectures gets recorded and can be viewed later, is useful in tackling this problem.

7. Closing remarks

ICT revolution in education and training is here to stay. It is likely to revolutionize the way education and training is provided. India faces challenges of training large number of teachers of both engineering colleges and polytechnics. The experiment with blended A-VIEW and MOODLE LMS platform has shown lot of promise[11] to contribute towards training such large number of teachers. There are some issues to be sorted out. New pedagogy must be evolved and infrastructural issues to be resolved, which will make training based on ICT mode more effective and practical.

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