

South Asia Human Development Sector

International Conference on Use of ICT and ODL in Teacher Education:
Bihar, India (June 13-15, 2012)

Conference Report Summary - Implications of Teacher Education Programs

June 2014



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South Asia Human Development Unit

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and ODL in Teacher Education: Bihar,
India (June 13-15, 2012)**

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Education Programs**

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ABBREVIATIONS AND ACRONYMS

BBOSE	Bihar Board of Open Schooling and Examination
BCF	Bihar Curriculum Framework
BRC	Block Resource Center
CIET	Central Institute of Education Technology
DE	Distance Education
DIET	District Institutes of Education and Training
DPE	Diploma in Pre-school Education
NCERT	National Council of Educational Research and Training
ICT	Information Communications Technology
IGNOU	Indira Gandhi National Open University
MHRD	Ministry of Human Resource Development
NCF	National Curriculum Framework
NCTE	National Council for Teacher Education
NIOS	National Institute of Open Schooling
ODL	Open Distance Learning
OER	Open Educational Resource
PTEC	Primary Teacher Education Center
RTE	The Right to Education
SCERT	The State Council Educational Research and Training
SITE	Satellite Instructional Television Experiments
SSA	Sarva Shiksha Abhiyan
TE	Teacher Education
TEI	Teacher Education Institutions
TESSA	The Teacher Education in Sub Saharan Africa

BACKGROUND

With *Sarva Shiksha Abhiyan* (SSA) transitioning towards the Right To Education (RTE), teacher education institutions and systems need to be fully geared up to meet the demands of pre-service and in-service teacher education and their ongoing professional development. Most states do not have adequate systems to provide the necessary cadres of trained elementary level school teachers. It is thus important to enhance the roles and capacities of teacher education institutions in India to support them to become globally competitive, professionally managed, and futuristically progressive to cater to the needs of huge back logs of untrained teachers. This training is crucial to ensure that children at the elementary levels get quality education in accordance with the National Curriculum Framework (NCF) 2005 and its basic tenets of child-centred pedagogy.

Recent analysis by the Department of Education showed that, in 2012, there were 523,000 vacancies for school teachers at the elementary level, while the Pupil-Teacher Ratio specified in the Schedule of the RTE Act would create an additional requirement of around 510,000 teachers. Moreover, approximately 774,000 teachers are untrained, that is, they do not possess the prescribed qualifications. Further, there are large inter-state variations in terms of percentages of untrained teachers, teacher post vacancies, and additional requirements of teachers under the RTE and the capacity of the institutions to prepare professionally trained teachers. Assam, Bihar, Chhattisgarh, Jammu and Kashmir, Jharkhand, Orissa, Uttar Pradesh and West Bengal together account for 606,000 untrained teachers and 973,000 teacher requirement. The problem is compounded due to the paucity of appropriate Teacher Education Institutions (TEIs).

The Case of Bihar

The State of Bihar has a huge shortage of teachers and the pupil-teacher ratio is below the national average. Most schools are single- or two-teacher schools, and many schools used to open for fewer than 100 days a year. Bihar recently adopted a policy of decentralized recruitment of teachers, as a result of which 242,000 new teachers were recruited. Because sufficient trained people were not available, most of the teachers recruited were untrained. These untrained teachers, numbering about 102,000, were provided access to two-year training programmes via distance mode by the Indira Ghandi National Open University (IGNOU). This was the first time that IGNOU conducted training at such a large scale. Though the university was able to provide printed course materials and academic support through academic councillors, multimedia and other technologies could not be optimally used. To meet the requirements of RTE, Bihar has to deploy another 300,000 teachers. According to estimates, 250,000 of these will again be untrained. It will be a major task to provide two-year training programmes to such a large number of teachers.

To meet such diverse and pressing needs, it is important to explore alternative mechanisms of providing teacher education that are professionally managed, address the issue of distance between teachers and the taught, and generate enhanced and innovative delivery mechanisms. Viable and effective options can be found that harness Information and Communication Technology (ICT) and Open and Distance Learning (ODL) in teacher education, especially to deliver pre-service teacher education. As is the case for other sectors of the wider economy and society, education providers will need to come to terms with the new technologies. This could require substantial public and private sector investments in software research and development, purchase of hardware, and refurbishment of schools.

The World Bank was requested by the state of Bihar to provide support in development of distance education curriculum, related syllabi, content, effective delivery mechanisms, appropriate student support systems, and assessment strategies to meet the needs of its untrained teachers. Many other states are facing similar problems, and will need to prepare comprehensive time-bound plans for untrained teachers to acquire the prescribed qualifications (both academic and professional). Thus, experiences in Bihar might provide models for developing an ICT-based teacher education system that can be used as a useful reference point by other states facing similar problems.

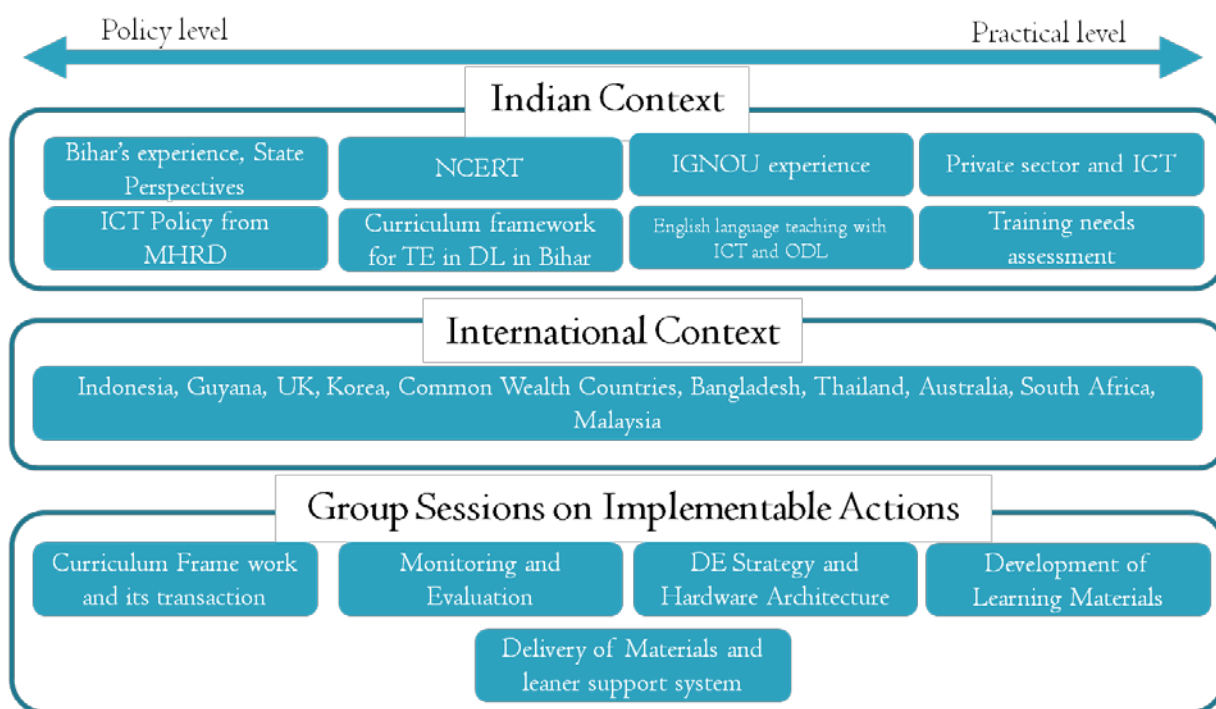
OBJECTIVES OF THE CONFERENCE

Within the above context and in collaboration with the European Commission, the World Bank organized a three-day capacity building and materials development workshop in the state of Bihar on 13th -15th June 2012. The objectives of the conference were to:

- Develop a strategy for ICT curriculum development, materials production, media selection, production, and dissemination of ICT materials to recover the backlog of untrained teachers;
- Share best international practices in ICT and ODL in teacher education;
- Identify strategies relevant for Bihar to address the specific challenges of the state;
- Deliberate on alternative strategies to train teachers efficiently on a large scale and in a relatively short period using innovative combinations of ICT and distance education; and
- Develop a delivery model and implementation guidelines which can be scaled up to regional and national levels.

The conference covered both policy and practice in teacher education, with particular emphasis on the use of ICT and ODL. Discussion reflected on both Indian and international experiences, while group discussion allowed participants to engage with each other to develop with implementable solutions. The Conference structure was as follows:

Figure 1 Structure of the Conference



The conference was attended by over 150 delegates, with representation from Indian and international organizations, including government officials, experts from teacher education institutions around India, representatives of the NGO and private sectors, and local and international teacher education and ODL experts. The list of dignitaries in attendance included:

- Shri. P. K. Shahi, Honourable Minister for Human Resource Development, Government of Bihar
- Shri. Nitish Kumar, Honourable Chief Minister of Bihar
- Shri. Pramod Tiwari, Director, Minister for Human Resource Development, Government of India
- Dr. Amarjeet Sinha, Principal Secretary, Department of Human Resource Development, Government of Bihar
- Dr. Hans van Vliet, First Counsellor, Development Cooperation, Delegation of the European Union to India
- Ms. Shagun Mehrotra, Education Advisor, European Union
- Mr. Michael Haney, Operations Advisor, The World Bank, India
- Dr. Shabnam Sinha, Sr. Education and Institutional Development Specialist, The World Bank

Below is a summary of the deliberations of the conference. This is a companion to a full Conference report, which provides summaries of all the individual presentations.

CONFERENCE PROCEEDINGS

Setting the Scene: The Context of Teacher Education in India

Several opening presentations set the context of teacher education in India. It was noted that it is critical to focus on the quality of teacher education programmes in India to achieve the goal of educating all children while ensuring equity of educational provision. Education is a fundamental requirement for ensuring human rights and democracy. India has made strong progress in reducing poverty and enhancing social inclusion, especially access to basic education, which is appreciable. However, in order to improve the quality of education in India and eradicate illiteracy, teacher education needs to be prioritized. Upon enactment of the RTE, however, teacher-related aspects became front line issues for education, and it is thus important to enhance the role and capacity of teacher education institutes in India to make them globally competitive, professionally managed, and progressively positioned to cater to the needs of huge back logs of untrained teachers.

The history of teacher education in India after independence started with the establishment of secondary education in 1952 and 1953. This created a need to professionalize teacher education, and also led to the birth of correspondence education for teachers in the early 1960s. In 1973, though, correspondence education programmes in teacher training became a cause for concern in government. A statutory body – the National Council of Teacher Education (NCTE) – was established to regulate the commercialization of teacher education programmes. In 1978, the first teacher education framework was introduced, which looked at teacher education from a holistic perspective, while discussion was held on the need for specific teacher requirements for the different stages of education. From 1986 onwards, decentralization of teacher education began with the emergence of District Institutes of Education and Training (DIETs) and colleges for teacher education. In 1998, a new national curriculum, including distance learning for teachers, was introduced. Thus, there is a strong and rich history of teacher education in India on which to draw in generating strategies to meet the challenges in Bihar.

There are three key challenges in the field of teacher education: (i) quality of education, including teacher retention at schools; (ii) organization of teacher training; and (iii) the need for sharing of good practice in the field of education. The NCTE has been preparing a national curriculum for teacher education, but there is value in drawing on wider experiences of countries

such as Brazil, China, Indonesia, and Malaysia when developing teacher education programmes in Bihar.

Bihar has shown very fast growth rates in the last few years, especially with respect to human development indicators, which reflect clearly the State's commitment to education. Bihar is also the only state in India that has earmarked 14% of its allocated budget to education. The State of Bihar's ultimate goal for children is 'high attendance, zero dropouts and completion of primary and secondary education'. The only way to bind the children at school is by providing quality and interesting education.

However, challenges still remain in the State, including quality of education, retention of students in the system, and school attendance (which was around 50% in 2012). Given these challenges, a key solution is to focus on reforming and developing the State teacher education system, particularly because State support for the teacher education system was unfortunately curtailed around ten years ago. Given this, the Ministry of Human Resource Development faces a challenge of rebuilding systemic capacity in this sector as there is a limited number of teacher educators in the State and a corresponding limited training capacity for teachers. It is important to ensure basic minimum standards in pre-service teacher education across the State, while also developing systemic capacity for continuing professional development of teachers.

To augment the context of Bihar, experiences from other states in India were shared at the Conference:

- Meghalaya State is aiming to train all untrained teachers by the end of 2015 as per the RTE guidelines. To achieve this, 16,000 teachers will be trained through IGNOU, 4,000 by the National Institute of Open Schooling (NIOS) teacher training programme, and the remainder through other courses. A key challenge is that there are too few training institutions, especially at the DIET level. Other problems include challenging topography, low teaching capacity, keeping the minimum qualification at 45% in class XII, insufficient time to train all teachers, and lack of a consistent support system for teachers. To help to alleviate these problems, continuous workshops, good networking with experts, and use of ICT in the form of mobiles or embedded chips can all help to make teacher training easier and more effective.
- In Gujarat State, there are no untrained teachers in government schools, while only 3% of teachers at private schools are untrained. Good ICT infrastructure, including video/teleconferencing equipment, exists in each institution, while the curriculum was reformed for primary schools. The enrolment ratio is more than 98%, the dropout rate is decreasing, and distance education activities are provided for upper-primary children three times a week. The only remaining challenge is to improve quality continuously.
- There are 40,000 untrained teachers in Assam State, but a state-initiated teacher training programme has been initiated for 18,000 of these to date. The NCF has been used as a

framework for developing the teacher training curriculum. The main challenge in the state has been a shortage of DIETs, as there are only 18 currently. This means that there are too few seats for trainees in all DIETs. In order to train more teachers, various proposals have been developed to increase the number of training institutions and their capacity. For instance, there is a proposal for increasing the number of students in each DIET from 100 to 150, and the NCTE has also approved five new DIETs. There is also a proposal to open DIETs in all districts of the state, as well as 18 block level offices with a capacity to train 50 teachers each. Further, 25,000 teachers have been recruited recently and another 20,000 will be recruited soon. In addition, the Government of Assam will conduct a Diploma course through ODL to train teachers and to clear its training backlog.

ICT policy in school education in India aims at preparing youth to participate creatively in the establishment, sustenance, and growth of the knowledge society, leading to socio-economic development of the nation and increased global competitiveness. There are three goals: (i) create an environment of collaboration, cooperation, and sharing, conducive to optimal use of, and returns on, ICT investments in education; (ii) motivate wider participation of all sections of society in strengthening the school education process through appropriate use of ICT; and (iii) promote universal, equitable, open, and free access to state-of-the-art ICT and ICT-enabled tools and resources to all stakeholders. To support these goals, various initiatives are in place:

- ICT @ school scheme – the Scheme supports ICT infrastructure procurement, as well as maintenance, running costs, software and e-content, and teacher training costs. In all, 190,643 primary schools and 94,752 Secondary and Senior Secondary schools have been covered under the Scheme.
- Rashtriya Madhyamik Shiksha Abhiyaan (RMSA) – RMSA ensures access to secondary education to young people from age 14 to 16, with emphasis on quality and equity, upgrading of upper primary schools, opening of new schools, and strengthening of existing secondary schools.
- ICT in schools – Here, a model curriculum for ICT is to be developed by NCERT.

The potential of ICT in teacher education includes its use in teacher resource management and administration, sharing and dissemination of a digital pool of learning resources, teacher capacity building, ongoing teacher support, establishment of a common platform or forum for Teacher Groups, and deployment of tools for evaluation and assessment, lesson plans, and teaching. Challenges and issues include concerns about reach and access, lack of ICT capacity in teacher training and teacher education institutions, lack of an ICT curriculum framework for teacher training, governance issues, and limited budgets.

Learning From Teacher Education Practices in India

Given its role in distance education delivery in India, it seemed appropriate to reflect on lessons learned by IGNOU as a key point of departure. IGNOU was established in September 1985 by an Act of Parliament, to democratize and augment opportunities for higher and continuing education, widen access, and promote a flexible and cost-effective system of education. Two major functions exist for IGNOU: (i) design, develop, and produce programmes and deliver them through ODL; and (ii) promote, coordinate, and maintain standards in open distance learning system in the country through a statutory body, the Distance Education Council (DEC).

IGNOU has provided education for over 4 million students in India and 43 other countries. It has 21 schools of studies and 425 faculty members and academic staff at headquarters and resource centres. There are 67 regional centres and over 3,000 learner support centres in India. Internationally, there are 80 learner support centres. In all, 36,000 academic counsellors from conventional institutions of higher learning, professional organizations and industry are available to support students. IGNOU is equipped with a network of 40 radio stations, TV channels, EduSat network, e-Gyankosh (national digital repositories to store, preserve & share digital learning resource), virtual classrooms, mobile-phone based learning platform (SMS alert services), on-demand admissions and examinations, webcasting facilities, and a YouTube platform.

Course instruction is comprised of self-study printed materials, audio and video materials, assignments, academic counselling, teleconferencing, interactive radio counselling, and dissertation/project work. IGNOU is a nodal agency to implement ODL activities under SSA, and thus helps States to design, develop, and use self-learning training materials. Despite available facilities and infrastructure, there is a problem of inefficient use. Other concerns include the need of improvement in classroom process, quality of learning materials, motivation and readiness of teachers for training, implementation of practical courses, coordination between State Governments and IGNOU, quality assurance, learner support systems, the need for physical (ICT) and human resources, and strengthening of management systems. Resolving these issues is a prerequisite for a successful teacher education programme.

Similarly, a distance-learning teacher training programme has been developed by the NIOS for untrained teachers, undertaken in collaboration with the state government of Jharkhand. There are five key areas of collaboration in this kind of ODL engagement: (i) curriculum and course materials; (ii) technology and instruction; (iii) resource persons; (iv) cost sharing; and (v) assessment and certification. Collaboration can be at the individual level, institutional level (placement of resource support), and a consortium level (sharing of expertise). Benefits of collaboration at the individual level include increasing opportunities for professional capacity-building, accessibility and equity, enabling credit transfer, enhancing competencies and level of

efficiencies, and quality control. At the institutional level, benefits include the expansion of outreach, shared vision, elimination of duplication, establishment of inter-institutional relations, improvement of quality of learning and materials, and innovations in methodologies.

The experiences of NIOS indicate that conditions for effective collaborations include: (i) mutual trust and respect; (ii) shared values and vision; (iii) openness and commitment; (iv) mutuality of benefit; (v) credibility and general acceptability; (vi) developmental needs; and (vii) government support. It is essential that the State identifies and ensures availability of infrastructure and resource persons/mentors at the decentralized level, establishes study centres as required by the programme design, ensures eligible resource persons to conduct the contact sessions, identifies locations to conduct contact sessions, and involves state-level resource institutions in delivery. Challenges of collaboration include copyright ownership, institution philosophy and policy directions, dominance of powerful partners, ideological differences, profit sharing formula, administration and logical bottleneck, and time constraints.

The Conference agreed that a new teacher education programme in Bihar, which integrates use of ICT, can help to improve educational standards at state-sponsored schools. Linked to this is a need to focus on improving classroom practice. Developing a system of assessment that focuses on students' achievement and not on their failures is also an important priority. Modules have to be scalable, replicable, and sustainable. Teacher education programmes need to grapple with the issues of pedagogy and classroom management for a longer time, to enable teachers to become self-reflective and deal with curricular issues and students. One delivery method of teacher education has been tele-education using satellite-based programmes. However, these encountered significant limitations, particularly in the lack of feedback channels and doubts amongst students about the delivery methodology. Also noted was the importance of teachers getting involved in curriculum and textbook development processes, as well as the potential value in harnessing existing materials available from projects and initiatives around India.

Currently, English education is introduced at an early stage, usually starting at grade one. Issues in English education include the poor quality of teachers' own proficiency of English, a lack of knowledge in English as a Second Language (ESL) pedagogy, and support for teaching. Current teacher training does not provide courses in ESL pedagogy, thus teachers do not learn its importance and meaning. A suggestion for English teaching methodology is to have a blended approach, which includes both face-to-face engagement between teachers and students and makes teachers autonomous and self-directive by using ICT. Textbooks also need to be teacher friendly and the assessments should be proficiency-based rather than text-based (memory-based).

International Best Practices and Emerging Innovations

Conference delegates – and especially speakers from the State of Bihar – stressed the importance and value of participants sharing their experience in teacher education and learning from one another. In particular, Shri. Nitish Kumar, Honourable Chief Minister of Bihar, noted that there exist different methodologies to train teachers around the world, so the State of Bihar expressed a desire to learn from others, while keeping in mind the critical question: what are the basic conditions of our existing teachers (in terms of knowledge, adoption capacity) for whom we will provide training? It was noted that it is not feasible to train as many teachers as require training in Bihar through a traditional face-to-face institution, because this would require multiple training institutes. There is insufficient time for this approach, as well as a requirement to ensure high levels of quality. The Conference thus needed to deliberate on innovative solutions to these remaining challenges.

Consequently, the Conference provided an opportunity to showcase international best practices and emerging innovations, which are summarized below.

- The ‘English in Action’ programme in Bangladesh is a collaboration between the Bangladesh University and the Open University, United Kingdom. It focuses on adult learners and learners from primary and secondary schools. In Bangladesh, English competency of teachers is low. In order to improve this situation, peer learning and coaching were introduced. Mobile phones were used with a memory card which had audio/visual data loaded. As an example of peer learning, teachers talked about what works for one teacher and shared lessons with others through video. Local accents were used for English materials, which can be played on the mobile phone. By allocating a quarter of the budget to monitoring, the programme was able to measure results effectively. It observed substantial increases in English language use in the classroom, increased opportunities for students to converse in English, and conducting of proper assessment of speaking abilities of students. This experience emphasized the importance of enabling teachers through peer learning, supporting them with adequate materials, and using appropriate technologies which are practical and readily available.
- Strategic Leadership of ICT (SLICT) was launched in 2001 by the National College of School Leadership to create leaders who develop e-confident or e-mature organizations. The programme runs for 10-12 weeks, providing content, challenges, and support, followed by ongoing engagement during implementation. The programme uses mixed learning styles and approaches, has continuous facilitated online support (including ongoing membership after the programme), and focuses on leaders (head teachers / principals). SLICT is not an ICT skills course, but rather focuses on online and offline self-reflection and development of e-confidence. It includes a 2.5 day residential programme incorporating school visits, reflection

and debates with peers, sharing of experience combined with expert inputs, and use of ICT in a curriculum-focused environment. The SLICT started with 150 heads in 2001, and had trained 13,000 heads by 2006. The National College of School Leadership suggests that there should be more parental engagement in monitoring and evaluation, self-review and teacher review should be placed at schools, networks among teacher coordinators and leading teachers should be developed, and local governments and other organizations in the field of teacher education should participate in teacher education activities.

- The Commonwealth of Learning (COL) has produced a ‘learning for development’ course which focuses on access and quality with ODL and ICT through Open Education Resources (OER). COL’s intervention for Strengthening Capacity of Teacher Education Institutions uses ODL to increase the outputs and quality of teachers in teacher education programmes.
- An approach to curriculum development was presented in which the course package has two components: a study guide and a resource pack compiled from OER. The learner uses materials from the resource pack according to the requirements of the study guide. This approach has been adopted with success by two open universities in Sri Lanka and Malaysia:
 - In Sri Lanka, in a course titled ‘Role of Teacher Educators as a Researcher,’ which is one of the six courses in Master in Teacher Education Programme developed by the Open University of Sri Lanka in collaboration with COL.
 - In Malaysia, integration of OER into a course titled ‘ICT in Education’ under a Master of Education Programme offered by Wawasan Open University, which is to be offered in the July semester of 2012.

The curriculum structure of the courses is different, but a similar constructivist approach was adopted for curriculum design. The Sri Lankan course adopted a blanket approach of using an OER course (with adaptation) in Research Methods to support scenario-based learning, while the Malaysian course used an approach of specifically identifying OER learning objects to link with every content section. This emphasizes that there is no one-size-fits-all model of integrating OER into course materials. The main challenges experienced have been to obtain licences to use technology and print materials. The payment of royalty to universities which rented the audio-visual material is an obstacle and more relaxation of licences in developing curriculum is needed.

- TESS-India is a sister project of the Teacher Education in Sub-Saharan Africa (TESSA) Initiative. The Open University of the UK is initiating the TESS-India project by leveraging its experience in ‘English in Action’ and TESSA, as well as its extensive Indian network. TESS-India is an innovative approach based on collaboration and partnership with the Ministry of Human Resource Development (MHRD) and state governments. The strategic focus and core principles of the project include: (i) complementing and enhancing in-service

training; (ii) availability of classroom-practice based units for teacher educators and teachers for India; (iii) availability of web-based, print, CD, and audio-video lessons; and (iv) focus on both the elementary and secondary levels. The timeframe for the project is three years, from 2012 to 2015, and currently it is operating in seven states, including Assam, Bihar, UP, MP, Karnataka, and West Bengal.

- The Boston Consulting Group introduced a closed-loop instructional system, which is proven to achieve better educational outcomes. The framework starts with holistic educational objectives, then relevant curriculum development and effective delivery, ensuring that assessments are embedded and allowing for real-time understanding of student performance, providing appropriate interventions and remediation based on those assessments, and continually tracking outcomes and learning at the student, teacher, school, and district level to ensure that all is going well. Technology enables this system to deliver better student outcomes, faster and potentially at lower cost. Content is no longer a problem, as it comes from multiple sources, including publishers, universities, teachers, and even passionate individuals, and most of it is free. The challenge now becomes about navigating, validating, certifying, and adapting content to fit one's needs.
- A government-directed teacher development programme was introduced by the Teacher Foundation, which trained teachers using Cisco's CEED platform and collaborating with the Department of State Educational Research and Training (DSERT). The objective of this programme was to use technology to deliver high quality remote training to several hundred teachers simultaneously at multiple remote locations. The implementation modality included allocating two lead/expert trainers at a host centre (six batches of 50 teachers each trained simultaneously in remote locations) and on-site co-facilitators (leveraging the active engagement of face-to-face training). The pedagogy used for this pilot was to simulate face-to-face training as much as possible. Positive results included efficient training of 282 teachers with one lead trainer as against 50 teachers in traditional face-to-face training. Lessons learned from the project included: (i) the lead facilitator behaviour needs to change; (ii) use of cues – visual or auditory – is essential to hold the attention of remote students; (iii) the technology, particularly the web camera, should allow lead trainers to be on their feet and mobile; (iv) orientation of teachers to the medium is necessary before training; (v) to further simulate face-to-face training, venues should be equipped with multiple speakers and cordless microphones; and (vi) the optimum number of participants for this kind of training should be 30-35 in a reasonably-sized room.
- Also introduced by the Teacher Foundation was a pilot initiative that examined two questions: (i) how are teachers using Facebook and what benefits are they drawing from it? and (ii) how are these perceived benefits contributing to the continuing professional development of teachers? In a six-month study, the Teacher Foundation examined the

following issues: (i) Reflection: Are there opportunities for teachers to reflect on their own classroom practice? (ii) Peer Networking: Do members interact with peers during the discussion? (iii) Sharing of classroom practice: Are there opportunities for members to share examples of classroom practice? and (iv) User-generated content: Do teachers initiate a discussion or share interesting and useful content on their own ? The mid-term result shows that there was an increase in the user base from 612 to 1,222, 0.83% of users on average posted feedback, and there was a 5% increase in membership every month. Results suggest that informal professional development on a social network is self-initiated, and this enables teachers to feel empowered.

- There have been various initiatives harnessing teleconferencing in teacher education in India. In 1975, for example, Satellite Instructional Television Experiments (SITE) was established and used for maths and science education, while primary teacher training was done through teleconferencing. In 2005, EDUSAT was launched and it has been equipped with 5,000 terminals-satellites. To date, though EDUSAT has been used in Bihar only for science and mathematics. EDUSAT has potential to provide video conferencing, as well as night-time loading and receiving of data. Through EDUSAT, NCERT conducted a 37-day orientation programme to train teachers on NCF 2005. However, EDUSAT is still not in full use. Concerns regarding use of teleconferencing include its limited flexibility in programme design. It is thus important to look at the content development process, build capacity of experts and coordinators, maintain feedback channels, conduct ongoing research, ensure optimum use of the network by all involved participants, and maintain hardware to ensure that it is not stolen and remains in working order. There is a need to design programmes that enable people to use the technology that is available. Thus, teachers across the country ought to be trained to explore the potential of EDUSAT for both teachers and students. In order to use teleconferencing effectively, there is a need for self-instructional materials, visual inputs, a lot of individual and group activities, telephone facilities for interaction, and internet connections to interact with a support system.
- CISCO's 'Inclusive Growth Group' was started to provide technology to rural areas to support education, health, skills development, and public services. The initiative uses cloud-base services and a replicable, scalable, granular, modular, and measurable model. It seeks to find technological solutions to virtually transport teachers to rural areas and use this to effect measurable changes. So far, the project has taught students across 30 locations, delivering 965 virtual classroom sessions over 310 days. Electricity challenges have been solved through the use of solar panels, and networking supplied by collaborating with Bharat Sanchar to provide links to remote areas. Teachers were initially sceptical, but now act as facilitators or co-coordinators when the remote teacher is teaching. Pilots were conducted in collaboration with SSA and DSERT at nine schools, covering 1,500 students in grades 5-8. Results from the project have demonstrated that participating students have performed better

after the intervention, especially in mathematics, science, and English. Dropout rates have also decreased and pass rates increased.

- Educomp has engaged in teaching and learning, capacity building of teachers, assessment, and governance, and currently partners with 14 states. The Educomp Smart Class is in 12,600 schools across the country. The initiative is implemented in collaboration with State governments. For example, in Haryana state, a 14-day in-service training programme was provided to 33,000 teachers across the state. The course included training on RTE, CCE, a bridging course, and content. This experience demonstrated that development of an e-learning culture requires engagement of learners, teachers, and administrators as key stakeholders.
- The objective of Save the Children is to build capacity at the national and state level institutions and within the education department in India by identifying and revising international models of best practices in the areas of teacher cadre management, school management, and leadership, with a particular emphasis on inclusive education in a decentralized context. Inclusive education consists of two processes: (i) increasing participation in learning; and (ii) identifying and reducing/removing barriers inhibiting learners from learning and participating. The project covers seven states, including Andhra Pradesh, Delhi, Gujarat, Jammu and Kashmir, Rajasthan, Orissa, and Himachal Pradesh. National-level studies have been conducted on teacher cadre management and school-based management. Constituents of these studies include state committees, district committees, and village committees. As a result of study visits, seven states have started reforms. Delhi and Himachal Pradesh now include school leadership, Andhra Pradesh wants to include inclusive model schools, and Orissa wants to improve learning standards. Currently, save the children has completed baseline surveys in all schools and Management Information Systems (MIS) reviews in the states. It will come up with an example curriculum for pre- and in-service teacher training and will try to institutionalize these reforms.

CONFERENCE GROUP DISCUSSIONS

As the above summary highlights, the three-day Conference generated a wealth of excellent information and insights to guide effective implementation of teacher education in Bihar using ICT and ODL. Using this wealth of information and the experience of conference delegates, five themes were identified to form a basis for group discussion throughout the conference. A short summary of each group's discussion is presented below.

Curriculum Framework

Currently, state personnel have already developed a suitable programme curriculum for teacher education in Bihar. Therefore, the priority is to consider how this curriculum can be delivered via ODL. It is important in this regard to look at models of curriculum available from IGNOU, NIOS, NCTE, and Bihar MHRD, amongst others. The next priority is to select relevant content for developing ODL material that can be used in the teacher training programme to provide certification to untrained working teachers in Bihar. The material should include a lot of examples and experiences, not just theoretical content.

The group made the following key recommendations:

- 1) Use the same modules for training both newly recruited and untrained teachers (while accommodating the experience of working untrained teachers within the model);
- 2) Reorganize and shift the syllabus/content spread over two years for content enrichment of teachers and in order to ensure deep capacity building;
- 3) Incorporate a rigorous action research component for in-service teacher trainees;
- 4) Contextualize content to make it specific to Bihar;
- 5) Supply guidelines/principles for the development of materials as part of the curriculum guidelines.

Development of Learning Materials

The group identified four key roles for learning materials:

- 1) Capturing and communicating the paradigm shift;
- 2) Increasing teachers' competence, by building teachers' understanding of the subject, their content knowledge, and capabilities within the subject in light of contemporary understanding.
- 3) Enabling improved performance of teachers;
- 4) Enhancing the likelihood of teacher 'effectiveness'.

Within this context specific advantages were identified in use ICT material. For example, video lessons can demonstrate what can actually be done, or dynamic visuals of shapes enable children to combine different shapes to come up with new ones. ICT materials can be interactive and can enable the creation of a 'community of learners'. Material can take the learner to the mastery level through the greater range and more dynamic as well as higher level exposure, and opportunities to act or do (with their minds). ICT Materials can facilitate the improvement of:

- Relationships: by making learners think, sympathize with others (for example, if we choose ‘characters’ they can relate with), make evident (for example, in videos about classroom practices) the kind of relationships that are desired and inviting teachers to reflect on them. Also, if the material is such that children and teachers learn something *together*, it will have a significant impact.
- Processes: by actually using constructivist pedagogy, encouraging the learner to struggle with, discover, form her own opinion and justify it, and so on.
- Outcomes: by focusing on higher order outcomes, or emphasizing those outcomes that really matter (but are often ignored) such as critical thinking, creativity, and the like.

It was noted that the following principles should underpin materials development:

- Use of universal design principles (UDL) in architecture to increase accessibility by a range of people, including those with limited access to language.
- Relevance (for my life, needs), as well as fitness to context, purpose, and needs.
- Development curiosity, avoiding giving ‘finished’ knowledge, with fixed positions. It would be helpful to give options, enable learners to choose, give their reasons, and so on.
- Presentation of a range of perspectives rather than a single one.
- Respect diversity and see it as vital to making a vibrant, effective classroom.
- Flexibility, adaptability and learner ‘control’ over material and learning.
- Enable constructivist learning, including collaborative learning.

Quality was also identified as critical. Material should not only include philosophy, but also give concrete examples. It is important to have contemporary and future-looking material, in line with where we want to go. The developers too need to be curious about knowledge, about the direction in which it is going to grow. Knowledge is not finite, and provision for this growth needs to be built in. The language needs to be easily understood. Material should enable the teacher to effectively communicate with children. Content should not be chapter-based but based on learning outcomes (from the curriculum, rather than the syllabus). It is also important to enable teachers to address all the possible situations that s/he will face in the class (for example, questions that children might ask and what to do about them).

The group identified four steps in material development:

- 1) Team identification: the team should be comprised of people from different sections and layers. They need to be oriented in a number of aspects and agree on roles and responsibilities. The team approach assumes that people have certain qualifications and understanding of the topic. The team would need to understand the Bihar Curriculum Framework (BCF) and its approach. Orientation is required on creativity, conceptualization, and visualization – across different media and subjects.

- 2) Pre-development: in this stage, the curriculum is converted into a course structure. It is also important to understand teachers and assess their needs, agree on the role and needs of materials, survey available materials, and identify materials and put them into a framework and learning flow.
- 3) Development: this comprises the following key steps:
 - a) Develop exemplars:
 - i) Make a few exemplars for the key categories (rather than starting on full-scale material development).
 - ii) Agree upon the overall structure for each 'unit' of learning; in terms of 'outline' or frame. Identify the different communication / learning methodologies to be used, then make a few exemplars.
 - b) 'Field test' or 'feedback' on exemplars (rapid):
 - i) Get feedback on draft material – from users, teacher educators, teachers, and on the basis of observation of classroom, transaction, and impact on children's learning.
 - ii) Improve the exemplar.
 - iii) Based on this, finalize a set of guidelines.
 - c) Test the dissemination strategy.
 - d) Develop the materials:
 - i) Create the material.
 - ii) Work in small teams.
 - iii) Editorial teams put together the work of small teams.
 - iv) Get continuous feedback to the extent possible.
 - e) Finalize the Year 1 'package':
 - i) Finalize the learning package.
 - ii) Do a quick review of the material as a package, peer review.
- 4) Post-development, comprising the following key components: D
 - a) Disseminate materials, initiate their use, and start getting feedback. Implementation during the first year will be the pilot. While the overall learning framework will be developed as a whole, the material itself will be developed in phases. While the first year's material is being developed and implemented (and feedback on it collected), the second year's material development will begin. Thus, it is important to put in place a feedback mechanism and a way to continue improving.
 - b) Orientation of facilitators. Most of the learning will be of the self-learning kind, and facilitators' role will be more in terms of support, discussion, contact sessions, quality assurance, and so on. Facilitators will meet, share issues, and get oriented. Generally, a limited role is envisaged for facilitators. Facilitators help a learning community to come about.

DE Strategy and Hardware Architecture

A number of key attributes were identified. The strategy should:

- Provide models of good practice to teachers, being carried out by their peers, in schools in similar contexts to their own;
- Enable teachers to participate in effective learning experiences themselves, characterised by respect, their knowledge and experiences being valued, and being given space to consider and explore new ideas with the support of their peers;
- Use a school-based teacher development and support model;
- Include head teachers, and incorporate aspects of improving school leadership;
- Relate to and involve the wider local educational system, including CRCs, DIETs and so forth, including teacher educators.

Using technology, teachers should be able to:

- View videos of good classroom practice and reflect on them;
- Use technology for doing practice exercises in their respective subjects;
- Conduct self-assessments to enhance their own subject capability;
- Engage with their students in warm, constructive ways;
- Use ICT for planning and documenting lessons;
- Use classroom technologies – mobile, laptop, computer and LCD projector – for ensuring effective student learning;
- Share and network with peers and colleagues on professional issues within the cluster, block, and across the district and state.

In order to achieve these objectives, access to a wider network for resources is recommended, while enabling teachers to make their own choices and create their own learning materials. It is also important to provide ICT infrastructure that can support teacher educators. In terms of stakeholder engagement, overall coordination and support at state, district, block, and institutional levels are needed. It is important to equip SCERT and district-level coordination and support centres with broadband networks and tiered caches to enable provision of support to DIET and BRC teacher educators, sharing collected OER resources, and access to wider resources and networks. It is also necessary to equip teacher trainees with laptops and video-conferencing capabilities to facilitate communication and resource development. Also, it is recommended to provide broadband connections and wi-fi hotspots to provide access for teachers. The project should tap solar energy wherever possible, and allocate coordinators to be in touch with CRCs and BRCs. A wide range of hardware can be used by teachers: tablet computers and similar devices, and laptops. Depending on budgetary constraints, either tablet computers (for accessing materials) or OLPC (for accessing, creating and sharing materials) might be recommended.

Key additional recommendations made were as follows:

- The majority of procurement should not experience any major obstacles, apart from timescale and assuming there are agreed procurement procedures to follow. Strong procurement should bring any of the equipment options in at a lower total price, especially where there is some competition in the market space.
- Internet bandwidth is challenging and, whilst the programme should aim for the best that can be afforded or delivered, it would be important to have appropriate linked caching systems so that what bandwidth is provided is supported.
- Power is a major issue. Some solutions are suggested, including UPSs at key sites, exploiting solar provision, and ensuring that any procurement of technology solutions for teachers and field staff are as battery efficient as possible. It would also be important to consider power provision for rural locations not in isolation, but to consider carefully other initiatives and potential links for joint funding for provision.
- Cost of equipment and infrastructure will be a challenge, and so it is recommended that existing and planned technology facilities are taken into account in the planning. Although very sensible, there might be obstacles relating to current owners and funders, senior state support may be needed to drive opportunities and efficiencies through.
- ICT provision is often undone by a lack of funding for and delivery of technical support. Technical support will be challenging as a result of the conditions and distributed nature of the programme. It is suggested that careful consideration is given to Technical Support and that systems are included so that remote management of equipment and software can be achieved. Also, robustness of equipment should be considered carefully against cost to reduce demand on technical support.
- A costing exercise should be initiated to establish what can be afforded within the funds available, and if there is any need/potential for applying for or accessing further funds.
- In parallel:
 - A detailed functional specification should be developed, tested and then, after any revision, converted into a detailed technical specification.
 - Based on the estimated costing, and considering viability, potential procurement approaches and specification work, a brief and plan should be established and agreed for procurement, delivery, roll-out and installation, training and implementation.
- Based on experience of other large schemes, there should be some phasing of the roll-out phase to ensure the most successful outcome.
- Success would be achieved if the:
 - Functional and technical specifications are produced on time and to quality;
 - Process draws real competition for excellent pricing against the market for equipment;
 - Delivery and installation phase is completed to budget, time, and brief;
 - Uptime of equipment and networking is above an agreed level (to be determined in specification phase);

- Feedback on the equipment from users is positive.

Delivery of Materials and learner support system

Five principles for the material delivery and learner support system were identified:

- 1) Collaborative learning is very important and ICT can support this.
- 2) The most effective development is close to the classroom. ICT can bring support close to the teacher in the classroom.
- 3) A wide range of team members is required to devise learning support strategies. This team should represent different voices – district, state, block, and teacher level.
- 4) It is important to pilot different distribution mechanisms.
- 5) There needs to be regular sharing and reflective meetings.

Three action areas are recommended: (i) provision of capacity building throughout the system and engagement of people in designing, testing and implementing; (ii) recruitment of teaching champions who have good interpersonal skills and are close to classroom realities; and (iii) creation of a system to enable the voices of teachers to be heard when designing the curriculum. In order to achieve these, it is important to take into account contextual realities, a need for alternative approaches to provide teachers access to audio/video resources, and the assessment of current teacher support systems in the classroom to identify areas of improvement.

Monitoring and Evaluation (M&E)

The concepts of monitoring and evaluation are distinct, but closely related and the line between them is blurred. It is thus important to define carefully how each concept has been used in the context of this plan.

- **Monitoring** is regarded as a type of formative evaluation and continuous observation of implementation progress. Typically, monitoring makes use of routine management information to establish the extent to which targets, outcomes and/or goals are being achieved, and to identify changes occurring. Monitoring usually focuses on the ongoing tracking of inputs, processes and outputs of a strategy or intervention over time. Continuous monitoring and data inflow is also a source for decision-making, programme planning, and course correction.
- **Evaluation** involves the interpretation of monitoring data to discern, explain and assess changes, trends, patterns and causalities. Evaluation research seeks to understand the impact that a strategy or intervention is having and is focused on the implications of what monitoring data shows. In sum, evaluation research takes a deeper and more complex look at monitoring data, and often includes the collection of additional research data to inform

evaluative conclusions about impact. Often, evaluation research will raise further questions that need to be considered in later evaluation studies.

Key principles of M&E identified were as follows:

- 1) Design of the M&E Framework should be tightly integrated with overall project design, to ensure that indicators of success defined for the overall project drive the design of the M&E and to enable the ongoing development of the M&E Framework to inform the final project design.
- 2) M&E activities should be an integral component of project delivery from the outset of the project. Rather than seeing M&E as an outside and largely inspectorial function, it should be tightly integrated with the project management processes so that it can serve to inform and improve project delivery on an ongoing basis.
- 3) The number of indicators of success to be measured through both monitoring and evaluation should be kept very few and as simple as possible. Once defined, these few indicators should inform design of all aspects of the M&E Framework, such as design of a Management Information System (MIS) for the project and implementation of a baseline audit.
- 4) An MIS system designed for the project should be an integral component of the project management systems, rather than being maintained simply for M&E purposes, in order to ensure that it is used and kept up to date on a daily basis.
- 5) Development of both the project and the M&E Framework should incorporate inputs from a wide range of players, including: teachers, teacher unions, students, school principals, government representatives, parents, and school students. In addition, the actual M&E activities should make provision for a wide range of ongoing, self-evaluation activities by project participants so that they are actively involved in the evaluation rather than just being passive subjects of evaluation.
- 6) The monitoring function will be done internally (i.e. by those involved in day-to-day project implementation and management) and evaluation will be conducted by a researcher or research team who are not part of the implementation process.
- 7) A dedicated percentage (proposed to be 5%) of the overall project budget should be ring-fenced for project evaluation in order to ensure that the M&E Framework is properly resourced. This is considered important not for the sake of M&E, but rather to ensure that M&E activities can contribute directly to increased efficiencies and improved performance in the project on an ongoing basis.

The M&E Framework should include measurement of the following key aspects of the project, with activities considering a range of inputs, processes, and outputs:

- 1) Project targets:
 - a) Infrastructural reach of the project;

- b) Flow of finances in the project;
 - c) Deployment of human capacity to implement project, combined with improvements in capacity (particularly amongst teacher education providers).
- 2) Effect of the programme:
- a) Number of teachers trained;
 - b) Evidence of knowledge transfer;
 - c) Identified changes in classroom practice occurring as a result of project implementation;
 - d) Growth in community confidence in schooling.
- 3) Development of people:
- a) Measurable improvements in teacher and teacher educator competence;
 - b) Extent to which project has met needs *and* aspirations of participating teachers.

Ultimately, it is expected that collection and analysis of data across indicators of success drawn from the above list will cohere into a form that enables deep and meaningful assessment of the extent to which the project has created:

- 1) Cost benefit;
- 2) Efficiency gains (as well as any potential unintended negative consequences leading to increases in inefficiencies);
- 3) Continuity, enabling continuation of activities to a next level or into a next phase of activity after the project is complete.

Detailed activities for the M&E Framework cannot be designed without first defining the proposed indicators of success. Nevertheless, the following broad structure of activities is proposed:

- 1) Baseline audit. It is proposed that the evaluation should commence with an initial baseline audit. Ideally, this activity could commence in parallel and also contribute to the project design, as should be possible to initiate this almost immediately. The baseline can then be used as a core data set against which future progress can be measured. The baseline should seek to capture:
 - a) Needs and aspirations of targeted teachers; and immediate school community (parents, guardians, and children).
 - b) Capacity development needs of possible teacher education providers;
 - c) Material realities in contexts in which programme delivery will take place, including regulatory and physical capacity constraints, willingness and motivation of the implementing cadres, etc;
 - d) Baseline Overview of classroom practices.

- 2) Design and implementation of online MIS System, which uses data from baseline audit as its starting data set and then is used throughout the project as a core project management tool, from which data for M&E activities can be drawn.
- 3) Establish and, as necessary, develop a team of M&E professionals, to be a mix of in-house and external experts. Though M&E is envisaged as an integral role of implementation, the M&E cadre would largely be a conscience keeper and problem-solver in matters of interpretation, data conflict, or overall analysis.
- 4) Completion of a Recognition of Prior Learning (RPL) activity for all teachers, in order to measure levels of competence up front and identify possibilities for credit exemptions (with RPL exercises forming a core part of the baseline data set).
- 5) Completion of a series of quarterly, rapid-fire project evaluation exercises for the first 12-18 months, in order to enable the M&E team to contribute to resolving key implementation challenges and thereby ensuring that the later evaluation activities are not falsely influenced by implementation problems.
- 6) Integration of ongoing monitoring activities into project management structures, systems, and processes, so that they are not conceptualized as running parallel to the overall project implementation.
- 7) Completion of a series of triangulated evaluation activities on an ongoing basis (precise methodology to be determined by project timing and indicators of success), including:
 - a) Surveys/questionnaires;
 - b) Interviews;
 - c) Focus groups;
 - d) Observations;
 - e) Possible early use of 'control' groups in schools – comprising teachers not yet enrolled in programme – in order to compare classroom practices run by teachers being trained and not being trained;
 - f) Self-assessment tools (including possible use of mobile apps);
 - g) Analysis of teacher assessment outputs;
 - h) Expert reviews of key outputs (e.g. curriculum content, deployment of LMS, technology architecture, etc).
- 8) Production of an annual formative evaluation report to inform project implementation;
- 9) Completion of a final summative evaluation report, to share lessons learned with the outside world.
- 10) Possible publication of academic journal articles to enable integration of project knowledge into global knowledge pools.

CONCLUSION: KEY MESSAGES

The objective of the conference was to generate ideas on how to deliver teacher training in Bihar using ICT and ODL. Deliberations focused on material production and media selection, as well as production and dissemination strategies. The Conference considered alternative strategies to train teachers effectively – for example, use of OLPC, mobile phones, and other innovative delivery methodologies. Areas of discussion started at policy level and were then taken to the operational level. Both the Indian and international contexts were discussed, while group sessions on implementable actions took place. Key issues discussed included national interventions in ICT, distance education in India, curriculum and statutory requirements, building on existing experience and materials, institutional contributions, innovative technologies, non-traditional training for larger gains, non-government and private sector inputs, state experiences, and training needs analysis. Through this exploration, the Conference has generated a wide range of excellent ideas that will inform the development and implementation of effective teacher education in Bihar.

Key messages emerged across the Conference that can usefully be taken into account during programme planning. These are as follows:

- 1) Given the challenges facing the State of Bihar, there are many innovative educational strategies and approaches that have been deployed, both in India and around the world that can be effectively harnessed to solve the problem of certifying teachers in the State. New ICT tools, in particular, offer innovative options for finding creative solutions to the State's challenges.
- 2) The design and selection of educational strategies and blend of learning methodologies in any teacher certification programme needs to take into account contextual realities in Bihar. Any use of technology identified must be designed to work successfully even in the most challenging rural environments in the State, and should accommodate the ICT proficiency levels of students and teacher educators alike.
- 3) Implementation of a teacher certification programme in Bihar needs to focus strongly on developing institutional capacity for ongoing teacher education in the State that can be sustained well beyond the life of the project.
- 4) Although ICT and ODL provide excellent strategies for solving the challenge of teacher education in the State, it is noted that ODL has historically faced immense challenges when it has not included sufficient student support. Because of this, it is essential to ensure that effective use of face-to-face sessions and interaction is integrated into the design of the programme.

- 5) There is a wealth of existing expertise, content (particularly OER), and other valuable resources available, both within India and internationally. This should all be harnessed during programme development, both to accelerate the development process and to ensure that the programme builds on the best of what is available locally and globally.
- 6) There is strong commitment from all key players represented in the Conference to ensure that a high quality, innovative ICT-based teacher education programme is developed and delivered in Bihar, which simultaneously focuses on building effective institutional capacity and accompanying ICT infrastructure within the State for ongoing teacher professional development.