Integration of ICTs in Teacher Education for Quality Assurance

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Abstract
Information and Communication Technologies (ICTs) is the key for unlocking new possibilities to envision modern education. ICTs or e-learning offers a great opportunity to raise educational standards in institutions of learning. Large range of ICTs tools are available for teaching and learning. Quality assurance is one of the central issues in teacher education debates today. Quality is a multi-dimensional concept. Quality is essentially a product of intensive investment of capital, technology, talent and hard work (Dutta, 2007). ICTs integrated teaching and training may be one of the potent factors for quality assurance in teacher education. The present paper discusses the concept of ICTs in teacher education for quality assurance and suggests some measures for effective integration of ICTs in teacher education so that the teachers of 21st century may be prepared to face the challenges of knowledge society.

Keywords
ICTs, Quality Assurance.

Information and Communication Technologies (ICTs) comprise a diverse set of technological tools and resources to create, disseminate, share, store, and manage data and information. Traditional ICTs tools e.g. TV, Radio, VCR, Tape Recorder, Fax and Telephone have already established their credibility and effectiveness in promoting the quality in the filed of education. The modern ICTs tools are Computers, CD-ROM, DVD, Podcast, PDA, Mobile Phones, Internet, and Wireless Communication Technologies along with powerful software which can process and integrate audio, text, video and data into electronic media.

Learning through the Information and Communication Technologies (ICTs) is called e-learning, which has been defined a number of different ways in the literature. In general, e-learning is the expression broadly used to describe "instructional content or learning experience delivered or enabled by electronic technologies" (Ong and Wang, 2004). Some definitions of e-learning are more restrictive than this one, for example, limiting e-learning to content delivery via the Internet (Jones, 2003). The broader definition can include "the use of the Internet, intranets/extranets, audio- and videotape, satellite broadcast, interactive TV, and CD-ROM, not only for content delivery, but also for interaction among participants." More recently, this definition can be further expanded to include mobile and wireless learning applications i.e. m-learning.

I. Advantages of ICTs-based Teaching

Use of ICTs-based teaching/training may be proved boon for teacher education, provided it is implemented effectively and efficiently. These technologies include a variety of delivery methods of instruction independently and also in mix mode with traditional method of instruction. According to Dahiya (2004), Information and Communication Technologies (ICTs) can help educators/teachers in the following ways:

- ICTs enable to enhance the initial preparation by giving good teaching and/or training materials, use simulators, recording and feedback practices in teaching and microteaching, other training institution experiences and working, introducing trainees with resource and support on cyber space, example the use of technologies for teaching/training institutions.
- With the help of ICTs, educators/teachers can access with colleagues, institutions and universities, centers of excellence/expertise, rich resources at cyber space.
- ICTs enable to interact with students over a physical distance. Increased and flexible interaction with student through e-mail and discussion forums is made possible.
- ICTs enable to access online libraries, journals and research to enable individual learning.
- Didactic software/courseware and Intelligent Tutoring Systems can dramatically reduce the cost of teachers training.
- ICTs enable to give immediate feedback and testing objectively without biases.
- ICTs provide life long professional development by providing courses at distant places in a virtual mode, training on demand, orientation and refresher courses through video-conferencing or on-line.
- ICTs enable or facilitate sharing of ideas, experiences as well as collaborating on projects, exchanging materials through virtual communities.

Use of ICTs in education has the following advantages: lower costs, time saving, flexibility, faster response, greater effectiveness, better morale, greater competitiveness and easy access to information and resources. Some of the other advantages of ICTs are quick and easy way to create, update and revise course materials through low-cost off-the-shelf software, location and time independent delivery of course materials, increased learner control through hypertext based presentation of information, opportunities for international, cross-cultural and collaborative learning, ability to combine text, graphics and a limited amount of multimedia, enabling instructional designers to prepare quality learning materials.

However, a number of studies have indicated that the successful pedagogical use of technology depends on teachers' attitudes and acceptance towards technology. In order to predict and understand teachers' technology use and acceptance, a well-defined framework is essential. In a study it was found that subjective norm, computer self-efficacy and perceived ease of use were main variables which play role (68%) in users' intention to use the e-learning system (Yuen & Ma, 2008).

II. Need of ICTs in Teacher Education

The face of classroom is changing. The teachers should prepare to keep up with technology utility in the classroom. ICTs are not only an essential tool for teachers in their day-to-day work, but it also offers them opportunities for professional development. The traditional modes of delivery lack basically three characteristics. Firstly, an instructor can only be available to some people at a time.

Secondly, instructor is not available any time and anywhere to the learner, and thirdly, he may not be up-to-date with the most recent information and ideas. Hence, ICTs are blended with classroom based learning and other types of learning to ensure technological, social and interpersonal skills are all learned properly.

In ICTs-based learning or e-learning, participants can collaborate and help one another, reach learning goals by providing feedback, answering questions, and working as a distributed group. e-learning can support educational institutions working together to raise standards by allowing collaboration between colleagues, allowing pupils to take special subjects offered by another educational institution without the need to travel. E-learning enables the development of teaching communities that can be used by teachers to share resources, including online libraries, discussion boards, and synchronous communication tools and help teachers to strengthen their curricular and teaching practices in professional collaborations to develop and review teaching materials.

E-learning is not a single strand but is multifaceted, covering a wide range of approaches and methods. One major but general benefit is that learning with technology can be motivating. E-learning has the potential to motivate, develop confidence and self-esteem, overcome many barriers that learners encounter, personalize the learning experience, widen access and improve the learning experience, while also helping people to develop their ICT skills. These are significant advantages that need to be made available to all learners (Clarke, 2007).

Classrooms are boring. Today students feel school is not challenging or interactive enough. It has been said that there are two reasons why we learn; some leaning is essentially forced on us while the other is what we sit back and enjoy. E-learning has brought back the joy in learning through its innovative and interactive content and delivery. E-learning has proved to be more appealing among students. Kai-Wen Cheng (2006) studied the student's level of satisfaction in applying e-learning in Taiwan. He concluded that student's level of satisfaction in applying e-learning for business courses is very high. Further he found that gender; school system and computer skills do not affect student's level of acceptance in applying e-learning courses. E-learning creates a learning environment which is characterized by SMILE, an acronym for simple, motivating, interactive and learner centric environment. SMILE blends the best of both the words- classroom learning and networked enabled learning (Sagar, Bagga & Bhat, 2007).

The conventional practices in higher education need to be replaced. "They have redefined e-learning as a core business process that must be automated like any other business process. They contended that, like other automated business process, learning must be integrated into enterprise application suites. There is no time or place for conventional events of institution in the automated workflow" (Adkins, 2003). E-learning has created a new dimension in education, both within and beyond the curriculum and is still looking at further opportunities of becoming more useful via new emerging technologies.

UNESCO (1994) considers that "teachers are in the vanguard of the twenty first century. In this context it recognizes the primordial role of teachers in shaping tomorrow's world and to give them the recognition and practical support they need to accomplish their vital task". This issue was also addressed in the 1996 report of Jacques Delors. The role of teachers is central to the over-all thrust of this report. According to this report, the concept of learning throughout life is one of the keys to the twenty-first century. As the world is increasingly comes into the classroom, the classroom must increasingly go into the world. Education, to be relevant and effective, must move into the community and into the workplace. Education must, in short, meet the challenges of rapidly changing world and changing patterns of life. The report further adds that traditional responses that are essentially quantitative and knowledge-based are no longer appropriate. Each person must be equipped to seize learning opportunities throughout the life.

NCTE document (1998) exhort that teachers are the torchbearers in creating social cohesion and national integration by revealing and elaborating the secrets of attaining higher values in life. Only enlightened and emancipated teachers lead communities and nations in their march towards better and higher quality of life. The foolproof, certain and dependable way to sustain the nation is via the medium of teachers. It is now a well-established dictum that no nation can rise above the level of its teachers. As a catalytic agent of change, the teacher is expected to play the dual role of a conservator, ensuring the continuity, and a social transformer, bringing about changes towards individual and national progress. To perform these functions effectively and efficiently, the teachers are need to be empowered in information and communication technologies (ICTs) skills.

III. Concept of Quality Education

According to Oxford Dictionary, quality means 'degree of excellence'. Quality is a value, it is not a unitary concept, and it is a multiple concept in higher education. Quality may be defined as skill, excellence, perfection, standard, competence for work and value for money. Quality may also be defined as combination of competence with virtue, excellence in performance and capability of delivering goods. To under stand quality education, it must be mentioned that what are the skills, which describe quality education. These are (i) Time management (ii) Ability to work under pressure (iii) Accuracy and attention to detail (iv) Oral communication skills, and (v) Managing different tasks at the same time (Khanna, 2005). The UNESCO documents on "Thematic Debate: The requirement of World of Work" has added a few more to this list, as flexibility, innovativeness, creativity, entrepreneurship, versatility and teamwork. These skills are parameter by which quality of higher education including teacher education is assessed.

Five principal approaches to defining education quality can be identified as given below (Mahadevappa, 2006):

1. Excellence

Education quality is the goodness or excellence of education delivery. It is both absolute and universally recognizable, a mark of uncompromising standards and high achievement.

2. Value

Education quality is the degree of excellence at an acceptable price or cost.

3. Conformance to Curriculum

Education quality means conformance to curriculum. It is the degree to which education delivery conforms to the curriculum.

4. Student and Stakeholder satisfaction

Education quality is defined as student and stakeholders' satisfaction.

5. Meeting and/or exceeding students' and Stakeholders' Expectations

Education quality is defined as the extent to which an educational service and/or exceeding the expectations of student and stakeholders.

Quality teaching is defined as teaching that maximizes learning for all students. Learning, in this definition, is comprehensive growth-continuing development in knowledge, skills, and attitudes. Comprehensive growth is accomplished teachers who have mastered the basic skills of teaching and are moving forward in their development of intermediate and advanced skills (Ranjan & Kothiwala, 2006). Quality teaching is only possible when teacher training institutions are in position to produce such educators/ teachers who are competent to use ICTs in education effectively and efficiently.

IV. Need for Quality Assurance in Teacher Education

Quality Assurance has been defined by Green and Harvey (1993) as "The mechanism and procedures designed to reassure the various "stakeholders" in higher education that institutions accord a high priority to implementing policies designed to maintain and enhances institutional effectiveness".

The International Network of Quality Assurance Agencies in Higher Education is of the view that ".…….quality assurance may relate to a programme, an institution or a whole higher education system. In each case quality is all of those attitudes, objects, actions and procedures which, through their existence and use, and together with quality control activities, ensure that appropriate academic standards are maintained and enhanced in and by each programme". Thus, quality assurance is a dynamic process involving continuous monitoring of performance and corrective measures when necessary (Dutta, 2007).

Education in the 21st century has become more complex than before. Rather the simple process of educating the young, to develop their cognitive, affective and psychomotor abilities; teaching young has become difficult. Now, education and training should be learner centered and should pace with rapid advancements in the society. Change has become order of the day and changes in society, its setting and values as well as the transformations in the culture have their influence on the individual. Education and training today has to keep itself ready for such a change. This puts lots of responsibilities on the shoulder of a teacher and the institutions imparting teacher education.

Quality assurance is one of the central issues in teacher education debates today. Quality assurance in the private sector is especially important given that few other controls exists other than market forces. Although there has been massive expansion of teacher education and higher education in general during the last five decades in India, the quality of education is at stake which is reflected in reports of various commissions and committees appointed from time to time in this regard by UGC. The curriculums are outdated, the courses are irrelevant, and the quality of teaching is below average to poor. On an average, every year some five million people join the ranks of employment seekers. An extremely disquieting feature of this disturbing phenomenon is that a large proportion of these belong to educated class who are unemployable. This concern was expressed in the GOI documents, Challenge of Education- The Policy Perspective, 1985. Our higher education in the new millennium must have quality, which should embrace its various functions and activities i.e. the quality of courses, the quality of curriculums, the quality of teaching and the quality of research etc. This assumes great importance in view of WTO and GATS and non-reversible process of globalization.

Globalization of economic activities, increasing demand from stakeholders for quality services and trade interests in education has motivated the developed countries to assure quality of higher education at internationally comparable standards. Compared to the developed countries, the developing countries face a much more complex set of forces that seem to be contradictory in nature. Making higher education accessible to a greater proportion of relevant age group is a critical requirement for developing countries and it carries with it the danger of spreading shrinking resources very thin over a large population. At the same time, the demand for skilled human resources of a higher standard is also mounting in these countries. Without human capital of high quality, the developing countries will have to inevitably fall behind and face the problem of marginalization from the rest of world. This has pressurized the developing countries to pay attention to the quality of higher education while still struggling to grope with the problem of improving the access parameters. In other words, whether developed or developing, countries have different compulsions to ensure and assure quality of higher education (Stella & Gnanam, 2005).

With 21st century placing a premium on knowledge and richness of human capital, it is an inevitable conclusion that the future will belong to those nations which are able to release the infinite potential locked up in their people. Only quality driven institutions of learning can serve as the ideal vehicle to pursue and realize such a grand opportunity for global leadership. The WTO regime on educational services presents an excellent opportunity to access global markets while throwing open our frontiers to external competition. With free market access, educational institutions will have to develop delivery models that provide advantages in terms of quality, cost, reliability and superior credentials.

The phenomena of quality education are gaining momentum in this technological era. Leaders in the field of quality education like G. David George of North Carolina State University and others are of the view that the use of technology can improve the quality and relevance of education. In this connection, the scenario of education is experiencing revolutionary changes. Each change has radically expanded and redefined the distributed learning environment of the day, thus enhancing both access and quality through three revolutions by using different generations of technologies time to time (Verma, 2004):

1. Individual Revolution: Reading-writing, key technologies include paper, pen, pencil, and later printing process;
2. Campus Revolution: Important technologies include lecturer halls, chalkboards, dormitories, laboratories, and libraries as well as roads that could bring scholars and students to universities far from their birthplaces; and
3. Digital Revolution: Key technologies include silicon chips, a globe spanning network optical fibers and satellites, telephone, fax machines, video cameras, CD-ROMS, etc. and agreement

about communications and data storage that under gird the World Wide Web i.e. Internet Technologies.

Development of quality in teacher education needs a dynamic methodology of education promoting fast access, easy connectivity, enhanced interactivity, enriched content, and relevant curriculum with respect to present demands. Practically, quality teacher education can no longer tolerate stagnant teaching-learning methodologies in the field of teacher education. Therefore, a traditional system of teacher education cannot permit a teacher to make teaching relevant to the needs of the society e.g. a book oriented, content oriented rather than skill oriented, examination oriented system of training is rather unable to provide the requisite opportunities to the teacher who wants to promote the objective of peace, cooperation and integral personality. For ameliorating quality in teacher education a vibrant methodology of teaching-learning needs to be adopted to make teacher training skill oriented and according to present demands.

In India, the National Assessment and Accreditation council (NAAC) had been developed in 1994 to assess the quality of higher education and teacher education also. The process of assessment involves preparation of Self-study Report by the Institution, Validation of the self-study Report by the Team of Peers on the basis of the site visit and final decision of accreditation to be made by the NAAC committee. The NAAC has been using a set of criteria to assess the quality of education in the institutions of higher learning:

- Curriculum aspects that include initiation and design of courses, feedback, etc.
- Teaching, learning and evaluation that includes educational technology, Pedagogy recruitment of facility, etc.
- Research, consultancy and extension, that includes research output, freedom to publish, academic-industry interface etc.
- Infrastructure and learning resources that includes physical facilities, lab, library, auxiliary services etc.
- Student support and progression, that includes financial aid to students, student's destination, counseling etc.
- Organization and Management, that includes administrative mechanism, its automation, budgeting, resources mobilization, etc.; and
- Healthy practices in open-ended items that may include anything that promotes academic ambience.

In the context of increasing tendency towards marketisation of higher education that the NAAC has formulated a value-framework that provides broad vision of higher education in developing countries in general and India in Particular (Prasad, 2006). The framework comprises of five core values that should inform all the activities of higher education. These are:

- Contribution to National Development,
- Fostering Global Competencies among Students,
- Inculcating a Value-System in Students,
- Promoting use of technology, and
- Quest for Excellence.

Globally, benchmarking is being increasingly advocated as strategy for maintaining quality in higher education. It is a means of making qualitative comparisons of performance usually with the view to establish good or bad practices (Schofield, 1988). Benchmarking initiatives like the NAAC and ISO 9000 are useful because they have created awareness in higher education institutions that they are accountable to their stakeholders whose right is to get quality education. NAAC as an apex body for quality assurance of institutions of higher education in India, has accredited 4006 institutions, 148 universities and 3858 colleges (includes reaccreditations and reassessment of 33 universities and 162 colleges) in the country (as on March 08, 2009).

There are so many parameters for quality assurance in teacher education e.g. quality infrastructure, empowered, competent and dedicated teaching faculties, proper learning resources and academic enrichment, need based and skill oriented curriculum with diversity and flexibility, proper teaching-learning pedagogy with the use of technology, provision of facilities for promoting research and development work, institution-industry interaction, effective system of management, stakeholders' satisfaction etc. But ICT is one of the potent keys for quality assurance in teacher education.

V. Integrating ICTs in Teacher Education Programme for Quality Assurance

ICTs-based education may be of three kinds:

1. **Online distance-learning courses:** The majority of, if not all, instruction takes place online. There are no requirements for face-to-face meetings between students and instructor, either in the classroom or via video during the course, called e-learning.
2. **Hybrid courses:** In these courses the instructor combines elements of online distance-learning courses and traditional courses. Online forums or Web-based activities may replace a portion of classroom sessions, which is known as blended learning.
3. **Traditional courses with technology elements:** These courses are traditional in that the instructor teaches all sessions in the classroom but with the occasional use of technology, such as Web-based activities, multimedia simulations, virtual labs, and/or online testing, which is known as e-enhancement.

In India, use of ICTs in education and training is in initial stage. Therefore, the second and third kind i.e. blended mode and e-enhancement mode or technology supplemented/integrated traditional courses will be effective approach for harnessing potential of ICTs in education and training. In the first mode, there are some possibilities that the teacher education courses may focus on the technology rather than the content. ICTs-based course materials may be time consuming for teachers to develop. Some students are technophobic just like some teachers. The active learning required by ICTs based courses may be difficult for students conditioned by prior courses to be passive. It demands self-initiative, self-guided and self-effort on the behalf of the learners. Students without ICTs competency (Digital Divide) are excluded from learning. All these challenges can be better tackled by supplementing/integrating ICTs in teacher education programme. Teachers must change their mindsets and accept a new teaching paradigm, which is from teaching to facilitating and managing learning rather than disseminating information. ICTs in teacher education must find its place but its incorporation has to be done very gradually without disturbing the existing pattern being followed for so many years.

Three main obstacles that may limit the successful implementation of ICTs in teacher education in U.K. are: student access to computers, the communications and information technology (ICT) policy adopted by initial teacher training providers and the lack of encouragement for students to use ICT on teaching practice (Murphy & Greenwood, 1998). The same is true in Indian conditions also. The biggest challenge in the effective utilization of ICTs in teacher training and its subsequent use in the classroom situation are the creation and integration of effective processes and systems that enable its utilization in classroom situations spanning different social and cultural contexts. It needs to be kept in mind that ICTs will become an effective tool only if it is an effective pedagogical tool. This would mean the creation of effective and interesting lesson for the students through coherent strategies that integrate ICTs into the pedagogical processes (Babu, 2007). The strategy which is best suited in Indian conditions is SMILE i.e. simple, motivating, interactive and learner centric environment. Content, technology, access to ICTs and collaboration are the key elements of this strategy. The right-mix and integration of key elements in a coherent manner transforms learning and teaching and prepare students to face the future with confidence and keep smiling. Teacher is at the heart of this strategy and his/her commitment is essential to create and sustain the SMILE strategy (Sagar, Bagga & Bhat, 2007).

Beetham and Sharpe (2007) reveal that "the most productive approach involves an ongoing attempt to accommodate technology into a course, with continued discussion about its purpose and ethos. This ongoing, transformative engagement with teaching serves a double purpose: it guides the use of technology and it provides the academics with an incentive to reflect upon their teaching and learn from the practical implications of technology adoption".

To adequately prepare teachers for work in the classrooms of tomorrow, teacher preparation programs need to develop programs that infuse ICTs into the entire program using authentic and pedagogically appropriate approaches. That is, 'students should learn about, learn with, and learn to incorporate technology into their own teaching' (SITE, 2002).

While integrating ICTs in teacher education curriculum, the emphasis should be to enhance particular concepts and skills and improve students' attainment. This involved a careful and considered review of curriculum area, selecting the appropriate ICTs resource which will contribute to the aims and objective of the curriculum and scheme of work, and then integrating the ICTs use in relevant subject areas. Four phases are conducted to implement ICTs in the classroom. The phases are (i) ICTs Literacy; (ii) The effective and efficient use of ICTs hardware and software for teaching-learning activities; (iii) Pedagogy based ICTs use (integration of ICTs in subject content, teaching, online support, networking and management), and (iv) Adopt best innovative practices in the use of ICTs (Singh & Dahiya, 2007).

The Society for Information Technology and Teacher Education (SITE, 2002) has recommended three principles for the implementation of ICT in teacher education:

- Technology should be infused into the entire teacher education programme.
- Technology should be introduced in context.
- Students should experience innovative technology supported learning environments in their teacher education programmes.

An example is provided by the International Intel Applying Computers in Education (ACE) project (Intel, 2002). The project trains classroom teachers to integrate the use of computers into existing curriculum to increase student learning and achievement. Originated in the USA in 1998, it is now in operation in several countries and in India also. The curriculum is summarized by these themes of training (UNESCO, 2004):

- Using computers and learning and productivity tools for both teachers and students.
- Using the types of computers and software that are widely available in both schools and industry.
- An emphasis on "hands-on" learning and the creation of lessons which teachers can effectively use in their classrooms.
- Encouraging teachers to work in teams, problem-solve and participate in peer-review of their lessons. (ACE project, 2002)

In ICTs-based teaching, the role of teacher changes from that of instructor to that of a facilitator. They need to be competent in using computers and in accessing the Internet. They got to learn how to design and operate ICTs-based teaching, as well as generate and disseminate the information and knowledge through ICTs-based teaching (Newton et. al., 1998). They should be encouraged to plan curricula, discuss innovative instruction methods, and exchange ideas with other teachers, either within or outside their institutions. Furthermore, they need to provide instructional resources and materials which they help students to access. Finally, they may need to guide and facilitate students' critical and creative thinking in a collaborative learning environment (Aggarwal, 2000).

As all of us are aware technology as a stand-alone will not work. The real challenge is the need to put technology – both space (EDUSAT) and ground segment, infrastructure, operations and maintenance systems, creative content generation infused with ICTs, target group networking and professional management together (Joshi & Purohit , 2004).

VI. Some Major Suggestions for Effective Integration of ICTs in Teacher Education

The following are some major suggestions for effective integration of ICTs in Teacher Education:

- Teachers must change their mindsets and accept a new teaching paradigm, that is from teaching to facilitating and managing learning rather than disseminating of information. Teachers should use of new educational technology and learning aids to prepare new educational material which broadens the horizons of learning and enriches the learning experiences of the students.
- A teacher and the students needs to learn to use e-mail and develop mechanism to develop learning groups to study the important aspects of the course by sharing their views and seeking guidance through e-mail exchange from the teacher educators/teachers.
- Most of the innovations in education and training programmes are marked by high costs per learner. But often there are ways

to handle more students while reducing costs per students. It may be as simple as renegotiating site licenses for specialized software so that costs per students can be lowered in exchange for serving more students.

- Teacher Training Institutions must develop competencies among teacher trainees in use of off-line e-resources (CD-ROM etc.) and on-line resources (World Wide Web etc.), and also in blended mode. Blended learning environments allow the pupil teachers to take part in both synchronous and asynchronous learning, overcoming barriers of communication, time and distance. The teacher training programme can have serious lacunae if the teaching pedagogy is not matched with the learning environment.
- Quality of teacher education can be improved considerably through extensive and optimal use of audio-visual technologies and Internet network. The courses in the field of teacher education so designed that the use of these technologies is made an integral part of training programmes and classroom activities, and to be a supplement in strengthening the learning experiences for students.
- The teacher educators/teachers should be motivated toward excellence by equipping them with tools of positive thinking, effective communication through ICTs, leadership, coping with stress and self-development (Dutta, 2007). Present scenario of using e-resources in teaching-learning conditions is very poor even at higher education level. There must be some reward system for innovative use of ICTs in teacher education curriculum.
- There is need to revise Teacher Education curriculum as well as curriculum in different disciplines of higher education in the light of technological advancement. The curriculum should include the knowledge and skills about computer and various e-learning tools, and information technology. Teacher education in information-knowledge driven world, expecting a new set of skills (core, generic and professional) to be inculcated among the prospective teachers to contribute effectively in the global society. Teachers must be trained for e-content development and delivery. In restructuring of syllabi, all the stakeholders such as students, teachers and users of service are effectively involved. However, teachers in particular, should be given considerable flexibility within the norms and benchmarks formulated by the stakeholders.
- E-content should be technological friendly, learner friendly and teacher friendly. E-content should use plenty of evaluation material to give feedback to the learner as to his/her achievements in a topic of course. It should include formative as well as summative evaluation.
- Learner Centric Pedagogy should be employed in developing e-content. Specifically the designer of the e-content should pay attention to the teaching model uses such as simple information communication, exploratory approach, discovery approach, mastery learning etc. Many types of interaction should be included to make learning effective and efficient.
- Considering the potential of e-learning UGC has initiated a scheme for development of e-resources in higher education, which could be used by the teachers and students of colleges and universities as well others within and outside India.
- A well connected e-infrastructure in colleges and universities is essential for the success of e-learning, and for access and delivery in order to design and direct a technology oriented curriculum. Hence, the regulatory agencies of higher education such as UGC, AICTE, NCTE, MHRD, MCI, etc. must be kept on top priority the funding for adequate e-infrastructure in the institutions of higher learning.
- Networking of the teacher education institutions will be prime requisite in the new global order. It will enable the sharing of the best human and material resources. Networking will enable cutting costs, ensure homogeneity in the standard of instruction and assure quality.
- There is wide disparity in the use of e-learning in India in rural and urban areas i.e. digital divide. Further, where the facilities are available, the same are not being fully utilized. There is also lack of adequate encouragement and partly because of difficulties, hindrances and red-tapism even in institutions of higher education. Proper feedback information at the Government bodies coordinating and controlling higher education and training is imperative in the management of the problem of 'digital divide' in academic institutions (Ahmad, 2004).
- E-learning materials (or e-resources) should also be available in various regional and local languages.
- To achieve the targets of Planning Commission (2007) and Knowledge Commission (2007), our educational sector must use a variety of new technologies to replace or supplement the classroom teaching and training.
- Provide free time for interested and committed faculty members to develop necessary ICTs skills for e-learning and ICTs integrated curriculum. Authorities must sent the teacher educators/teachers on priority basis for attending OC/RC in IT, seminars, conferences, and workshops on ICT theme to introduce them with latest pedagogy of teaching and training.
- Video cassettes, CD-ROMS, DVD, online tutorials etc. on different topics in each and every discipline should be prepared with the help of subject experts. These e-resources can be made available to the departments of various universities and their affiliated colleges, which may be used both by teachers and students as well. Presently such e-resources e.g. video lectures are available in abundance in science and technology through YouTube but there is dearth of such e-resources in humanities and social sciences.
- Teachers must be responsive to the demands of changing curricula while making theoretical knowledge application oriented for equipping the learner to face employment needs.
- Teachers need be encouraged to reflect on, and make decision about their own ICTs development needs on an ongoing basis, ensuring more involvement and greater integration of ICTs within the teaching and learning process.
- Teachers need to provide a support for integrating technology and overcoming their isolation as they grapple with new and unfamiliar approaches to teaching and training, and tools of learning. They also need real-time technical support in resolving problems related to hardware, software, and computer networks; problems that often interfere with or even derail the learning of both teachers and students(Ranjan & Kothiwala, 2006)
- Mushrooming of private teacher education institutions is a threat for quality teacher education programme presently. These private intuitions should accept equality, access, quality, innovativeness and futuristic orientation as guiding principle in overall organization and management of teacher education.
- The regulatory bodies of higher education, particularly

NCTE, have to shed their conventional mindset and rise to the demands of the 21st century in charting the course of teacher education. NCTE must be open, fair, accountable, transparent and realistic in making judgements and in decision-making regarding pedagogy and curriculum of teacher education.

- Teacher education institutions world over need to plan, design and conduct ICTs based teacher education course. Such attempts will not provide employment opportunities for the prospective teachers but will also help the system of education to pass out better trained teachers proficient in using e-teaching-learning strategies viz.; i) E-Lecturing, ii) E-Tutoring, iii) E-Mentoring, iv) E-Discussion Forum, v) E-Access to Network resources, vi) E-Structured Group Activities, vii) E- Informal Peer Interaction, viii) E-Connected Education and; xi) E-Quality Learning and Simulations (Verma, 2007).
- Teacher education institutions should establish their own functional Internal Quality Assurance Cell (IQAC) which will open new vistas for attaining the quality education in the particular institution. The prime focus of IQAC should be imparting value based education and innovation; promoting pedagogical innovation; encouraging innovative teaching and training practices among teacher educators; disseminating of best practices within the institution and also among other institutions, etc. The IQAC needs to involve all the functionaries of the institution extensively and motivate them to be part of the quality initiative. They may arrange for sessions on quality concepts, strategies, processes and feedback mechanism to make it more rigorous (Hegde, 2009). IQAC must monitor and evaluate the whole ICTs integrated teacher education programme to get the effective results.
- Regina M. Clark has identified Ten Action Points (TAP) for the innovative practices are: i) Get rid of mental locks, ii) Use both sides of your brain, iii) Learn creative thinking techniques and use them!, iv) Move outside of your area of expertise, v) Avoid the classic innovation traps, vi) Allow failures, vii) Create a process amp, viii) Get people involved, ix) Get out of your way, and x) Create an environment that supports innovative thinking. Teacher educators, administrators and policy makers should implement these action points for harnessing the full potential of ICTs in the field of teacher education.
- Empowering our teachers/educators with ICTs skills can be systematically chalked out through continuous staff development programs for in-service teachers while the new comers will get entrance to ICTs if it is included as a core program in teacher education curriculum. For in-service teachers, the apex bodies like NCTE, NCERT, ICSSR, UGC-ASC, IGNOU etc. should launch a two phase programs-first phase program should focus to develop ICTs literacy and the second phase program should focus to develop ICTs competencies. In case of new comers, teacher education institutions and their regulatory body NCTE should introduce ICTs as a core program in teacher education curriculum and should provide the required technical and infrastructural support to the educational institutions.
- Though the governments are taking initiatives in this direction but that is not sufficient. Governments should provide all the required infrastructure and financial support to the educational and teacher education institutions in making ICTs literacy and then ICTs competencies among educators/teachers so that our teachers/educators can be empowered with all the necessary skills in 21st century.
- The empowerment of teachers in ICTs based teaching also largely depends upon teachers themselves. Teacher educators no longer are in a position to depend on others to see to their development needs. They have to re-establish their role of a teacher educator as a professional. They themselves have to chalk out a programmme for their own enrichment and professional development. They have to be the self-propelled learners, continuously examining themselves with respect to their competencies, performance and commitment towards their profession (Garg, 2009). Teachers/Teacher educators must have will power and curiosity to learn the emerging technologies which help them to do their job efficiently and effectively rather looking for any programme on the behalf of government or regulatory bodies. An empowered teacher with ICTs skills will pave the path to make India as developed nation.
- The effective and efficient use of ICTs depends largely on technically competent teacher educators/teachers. They should be able to appreciate the potential of ICTs and have a positive attitude towards ICTs. They should operate computer and use basic softwares viz. Word Processing, spread sheets, Power Point etc. and should be able to integrate the use of computers and related ICTs tools for training and education of teacher. An educator/teacher will be able to integrate the use of ICTs into training/teaching effectively if he/she develops various competencies like creativity, flexibility, logistic skills, skill for project work, administrative skills and collaborating skills.

VII. Concluding Remarks

Information and Communication Technologies (ICTs) is the key for unlocking new possibilities to envision modern education. ICTs or e-learning offers a great opportunity to raise educational standards in institutions of learning. Large range of ICTs tools is available for teaching and learning. It closes the gap of "Digital Divide" but at the same time it demands involvement of teachers and students. Teacher education institutions will need funding, access and training. Future learning is now focusing on learning beyond the classroom and curriculum. Institutions of learning particularly higher learning need to upgrade their teachers by offering re-training programmes. Integrating ever-changing ICTs is a challenge to the academia as it throws open new corridors for both teachers and learners. Its management requires leadership, which is very well accustomed to ICT as well as new processes of e-leadership. Planning, organizing, directing and coordinating of ICT for all sectors of education will be required. It will require a massive effort on the part of all educators/teachers (Kondapalli, 2005).

For enhancing the ICTs skills of teachers, organizations like the NCERT (National Council of Educational Research and Training), and NCTE (National Council for Teacher Education) etc. has been launching schemes from time to time. Recently, NCTE has been launched a new project for integrating technology in education: the XPDITTE (X-elerated Professional Development in the Integration of Technology in Teacher Education) project in collaboration with Intel® Teach Program. The Intel Teach program is a globally acclaimed program that is being implemented in 40 countries worldwide. It aims to help classroom teachers learn how best to use technology to improve teaching and learning. This collaborative project aims to provide professional development in technology integration to all teacher educators across the country.

The implementation of Intel® Teach Program to the future has been the most exciting input in teacher education in a long time. UGC too conducts IT / ICTs orientation programmes for university and college teachers through the Academic Staff Colleges (ASC) throughout India.

Quality is a multi-dimensional concept. Quality is essentially a product of intensive investment of capital, technology, talent and hard work. Quality is not a chance, but a choice. Quality again is not an accident, but a design. Quality is not a destination, but a continuous journey (Dutta, 2007). Only integrating ICTs with the teacher education curriculum can not alone ensure its quality. But ICTs integrated teaching and training may be one of the potent factors for quality assurance in teacher education. The new technology if exploited and implemented effectively can bring sea change in teaching-learning process thereby solving many educational problems such as quality of product, wastage and stagnation, mass failure of students, delinquency and truancy. New technology has immense potential and can herald as a revolution for the world of learning, but it is possible only if those involved in it give themselves the means to do so.

Peter Drucker made a statement in his article The Death of the University that: "Thirty years from now the big university campuses will be relics. Universities won't survive...." so that higher educational institutes shake off their inertia and utilize ICTs to its best. Our higher education sector should also critically appraise what he meant to say for higher education institutions in the western world and think of making the best use of ICTs for their respective institutions (Bhattacharya & Sharma, 2007).

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