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ICT SKILLS FOR TEACHERS AND TEACHER EDUCATORS

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Introduction:

Information and Communication Technology (ICT) is a boon to every human being to make life simple and fun. It has its impact in all fields like education, business, transport, security, entertainment, etc. ICT is the most powerful tool to developteaching - learning process to attain its objectives through innovation, creativity, imagination, feasibility and creating new ambiance.Computer, Technologyand Education are directly proportional indevelopment.Recent investigations [(Kwok & Jones 1985), (Carver et al., 1999), (Gilbert & Han 1999), (Grigoriadou, Papanikolaou & Kornilakis 2001), (Stash & De Bra 2004), (Hong & Kinshuk 2004)], try to integrate the learning styles and e-media in the design of their applications for education.Attaining the teaching objective with the aid of computer depends on itspurposeful &effective use in teaching – learning process.Higher Education and in particular Colleges of Education are often viewed as falling behind in the use of technology for teaching and learning. (Lederman & Niess, 2000).

Some of the ways in which higher education institutions have responded to the challenge of implementing ICTs in teaching and learning include developing coherent institutional strategies to change (McNaught and Kennedy, 2000 and Salmon, 2005), focussing on the impact of learning technologies (Beetham et al., 2001, Timmis, 2003 in Conole, White and Oliver, 2007) and the offering of models for representing and understanding organisational contexts and change management (Morgan, 1986 and Mumford, 2003 in Conole, White and Oliver, 2007).Yet another strategy employed by higher education institutions in response to such challenges focuses on support and skills for staff development issues (Smith and Oliver, 2000; Oliver and Dempster, 2003 in Conole, White and Oliver, 2007), placing greater emphasis on the professionalisation of academic staff as teachers and assessors.

The expansion of the application of technology in teaching and learning has been one of the most ubiquitous major recent changes in higher education (D'Andrea and Gosling 2005).An efficient computermajor teacheror any teacher using ICT should train themselves with skills of using ICT in class room teaching learning process. At Stanford University, USA, 14 skills for teaching were introduced by Allen & Ryan and in India, 13 teaching skills were identified by Dr. B. K. Passifor classroom education process. In addition to these, more number of teaching skills is being identified and introduced as and when need to smoothen the course of education. This paper recommends ICT skills for teachers, students, student teachers and users of ICT to make use of it effectively for teaching and learning.

Learning strategies are specific action employed by the learners in order to make learning easier, faster, more enjoyable, more self-directed, more effective and more transferable to new situations. Learning strategies are classified as direct (memory, cognitive & compensation strategies) and indirect (metacognitive, affective and social strategies). Memory strategies include mental linkages, applying images and sounds, and receiving well. Cognitive strategies are practicing, receiving and sending messages and creating structure for input and output. Compensation strategies are identified as guessing intelligently and overcoming limitations in language knowledge. Metacognitive

strategies involve entering, arranging and evaluating one's learning. Affective strategies refer to lowering one's anxiety, encouraging oneself and taking one's emotional temperature. Social strategies mean learning by asking questions, co-operating with others and empathizing with others. These strategies are applied to the four learning skills of listening, reading, speaking and writing. (Oxford, 1990).

Relates Studies:

Educational technologists routinely provide research to support the use of technology to accelerate learning, to make educational practice more efficient and effective (Oliver, 2006) and enhance learning opportunities through online learning environments (Franklin & Vonderwell, 2002). "To motivate today's students, many researchers suggest the application of videogames in school settings" (Foreman, 2008; Gee, 2003; Prensky, 2001; Van Eck, 2006). Software simulators are useful tools in education to teach complex concepts. A few examples are BRAINTRAIN (Panchaphongsaphak, et al. 2007), MICROWORLD (Kato, 2006), Simteacher (Fischler, 2007) and PSpice (Hart, 1993) simulators to teach medical, business, education and engineering students respectively.To motivate Second Language (SL) / Foreign Language (FL) learners, research advocates the adaptation of videogames in English – as- Second Language (ESL) curriculum (Baltra, 1990; Cruz, 2007; Meskill, 1990; Purushotma, 2005).Mobile learning or m-learning, a relatively new concept, has attracted the interest of educators, researchers, and companies developing learning systems and instructional materials.Video games immersion increases learner's chances to be exposed to an authentic meaningful interaction with the target language (Purushotma, 2005).

According to the cognitive theory of multimedia learning (Moreno and Mayer, 2000), when learners simultaneouslyprocess pictorial and verbal information, they need to integrate both types of information in the working memory inorder to form a mental model based on their understanding of the learning material.And today's digital tools makeit possible to expand the walls of the classroom and enable the integration ofresources – scientific data, library collections, video and film archives – fromacross the globe into the curriculum. (Bransford, et al., 2000). The use of interactions is considered an important factor in teaching and learning via computer-mediated communication settings (Pena-Shaff*et al.,* 200l).

ICT Skills:

Skill is defined as the capacity of performing any task absolutely. It is also called as talent. Skill is a domain based activity. The basic skills required for an individual to survive better in this competitive world arereading, writing, communication, computation (e.g.: addition, subtraction, counting, etc.,) and basic computer / e- gadget operations. Laurillard (2002); Mishra and Koehler (2006) and Unwin (2007), have cautioned against the use of ICTs without a conceptual framework or without a clear understanding of why and how the ICT will contribute to students' learning. There seems to be emerging consensus that the integration of ICTs into teaching and learning requires balancing different sets of knowledge and skills. Some skills are inborn and some are acquired by practice and training. An individual from a music family tunes to the rhythm much quicker than an individual from a non-music family background. It is due to the hereditary communication process and referred as inborn skills. In the present educational system, practicing or developing skills for teaching is the agendain the professional B.Ed. and teacher training degree courses. Information and Communication Technology (ICT) builds the bridge between the digital divide by providing information and communication facility to every cent of the country. In this

modern world, teaching and learning technology becomes inevitable to the students and teachers.

Information and Communication skill is defined as the skills that are required for an effective use of ICT to attain the objective with information and technology. The level and nature of the skills differ for different fields like education, industry, engineering, medical, business, graphics, animation, arts, research, etc.,. The use of ICT in education lays a stepping stone to the future innovation &inventions in this digitalized world. In this context, the question is how many teachers / student teachers use or know how to use ICTefficiently to face the challenges in the emerging teaching learning progression? How to ascertain the mastery level of teacher educators / student teachers using ICT in teaching learning process? How to evaluate an educational teaching / learning multimedia packages/e-content/web page? How to design teachers tools for teaching learning process using ICT by the teacher? In what way ICT can effectively be used to solve problems in instructional and administration process? How to provide smart education? etc., This paper casts it light upon the ICT skills that are can be practiced and felt essential for teacher educators and students teachers in teaching learning process.

Methodology:

As a measure of finding an answer to the above questions, a practical test was conducted in a computer lab for a team of 12 Teacher Educators from a Government and Non-government Colleges of Education. The test was administrated for a time period of about 20hours distributed in four days.To identify the nature and mastery level of ICT skills of student teachers, 120 student teachers were subjected practically to a skill assessment test usingcomputers with a specially designed tool called em-questie., electronic multimedia questionnaire.

Fun makes learning process engaging, relaxed and comfortable (Prensky, 2002). To test the skill of using ICT for teacher educators and student teachers, a tool was designed and developed with unique features. It is anelectronic tool that containsman options which a normal questionnaire lacks and called as 'em-quest'. The em-questhas the facility to test the skills like inserting audio, video, image, slide transition, textual animation, etc.,. Utmost care has been taken to ensure the em-questto test objective with respect to all the three domains. Aesthetic sense is given importance as it is an essential and basic skill required to develop, create, manipulate, evaluate and present the given task or answerquestions using computer for rich experience. The designed em-questconsists of 60 skill assessing, multimedia and activity based questions. Em-quest was validated and tested for its reliability, practicability and fairness with the help of field experts.

Experimentation:

To examine the skills of using computer for teaching learning process in the present educational scenario, an experiment was conducted using an em-questtool in a computer lab. The designed em-quest containing 60 skill assessment questions was standardized using face validity test retest reliability. The tool was experimented to 120 student teachers and 12 teacher educators and their responses were carefully coded as per the test administration design. A test administration matrix was designed especially, for testing 120 student teachers with a maximum of 30 minutes testing time duration for each student. The scores are then decoded from the matrix to identify the individual scores.

Result:

The result of the experiment was astonishingbecause,

- ✓ only **20%** of the student teachers and **10%** of the teacher educators hav performed better,
- ✓ nearly **20%**of student teachers and **15%** of teacher educators were good and
- ✓ remaining**60%** of student teachers and **75%** of teacher educators has poor skill of using computer.

Analyzing the outcome of the test result, many reasons for poor performance have been identified. Among all, the important reason admitted by the student teachers and teacher educators is that, there is no structure in practicing skills for using ICT in teaching learning process as the skills identified in teaching pedagogy. Some teacher educators and student teachers are found to have difficulty in mouse control during the experiment. It was also identified that greater percent of student teachers were not exposed to computers in their school, where it is only in the curriculum itself. Many teacher educators reported that there is no scaled programme to inculcate competencies and skills in administrating ICT for teaching learning process.

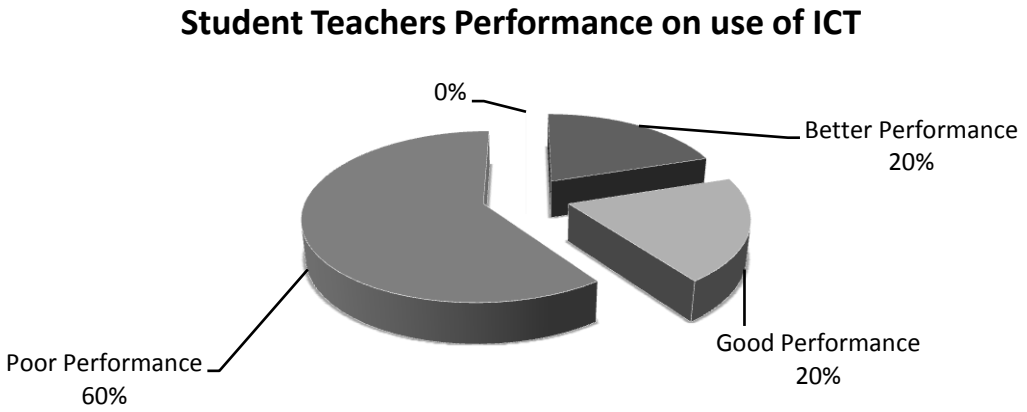

Figure 1

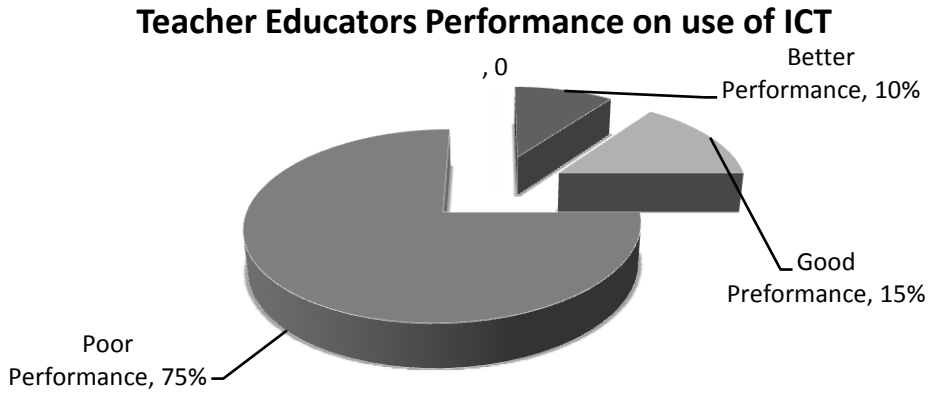

Figure 2

Note:
Better Performance: Able to complete the given task.
Good Performance: Able to attend the task but incomplete.
Poor Performance: Unable to complete and lag basic operations like mouse control, menu options, tool functions, selecting, copying, moving, etc.,

The Report and Recommendations of the Arizona Summit on 21st Century Skills picturise that one of the greatest barriers to developing 21st century skills in classrooms is that teachers tend to lag behind students in their use of technology. The present study recommends the need to use state-of-art technology and skills routinely as a tool for teaching, learning, creating and working productivelyfor the 21st Century.

According to the cognitive load theory, when the learning material has high intrinsic load or high element interactivity and when they are presented as text with any kind of visuals, it is better to present texts aurally because the efficiency of information processing in working memory will be enhanced if information is presented in different modalities (i.e. the modality effect). When visuals are combined with text presented visually, learning is impaired because learners have to split their attention between text and visuals, in order to integrate both sources of information (i.e. the split-attention effect). The modality effect and the split-attention effect seem to be repeatedly confirmed in a series of studies conducted by Sweller, Mayer and their co-workers (Mousavi, Low and Sweller, 1995; Sweller, van Merriënboer, and Paas, 1998; Kalyuga, Chandler, and Sweller, 1999; Mayer and Moreno, 1998, 2002; Moreno and Mayer, 1999; Mayer, Moreno, Boire, and Vagge, 1999).The educational software, courseware, games, e-contents, computer assisted instructions etc.,should be designed and developed with minimum split attention effect and maximum modality effectand evaluate for the same also. The teacher and teacher educators should be trained to reduce split attention effect in respect to their subject nature.

The need for ICT skills and its trainingin education is felt essential worldwide in different context and Laura Turner (2005) listed 20 technology skills that every educator who are involved in higher ed., secondary ed., elementary ed., or special ed., should have known.The outcome of the test result analysis formed as a base in recommending 21st century ICT skills required for teaching learning process in general and for teacher educators and students teachers in particular.

Recommendations:

The presentstudy poses the awareness of required essential ICT skills to the teachers and learners.Utilization of the technology skills will engage students while improving their grasp of educational objectives. The ICT skills should not be used in isolation, but rather, as a tool for achieving the educational objectives. The technologies required for teacher educators and student teachersare handling ICT tools, productivity tools, research tools and evaluation tools.

An ICT tool offers teachers and students a means to improve integrating information with technology, communication and interaction amongst students, teachers and parents. ICT can aid the teacher in reinforcing instruction, increasing the level of contemplation/discussion on a topic or simply informing his or her audience.Productivity tools are software programs used to produce an end product. The most easily recognized tool is a word processing program such as Microsoft Word or Open Office. Other tools helpsto calculate sets of numbers, draw graphs, edit photos, make video lessons, create a newsletter, poster or greeting card.Search tools are websites such as Google or Yahoo to search for the required information or source in internet.

For the effective use of Information and Technology for teacher educators and students teachers in teaching learning process, ten ICT skills were recommended.
They are,

1. Skill of File Management and Recognizing File Types: File management is the practice of organizing files and folders in some logical manner. This logic should make sense to others beside the creator.Any data can be stored in a computer as a file with aparticular extension. An extension represents the type of the file. As the extensions are of different types, any two files can have similar name. Some of the frequently usable extensions file types are .jpeg for pictures & photos, .txt for text file, word forword

document, .xls for spread sheet (Excel file) .ppt for Power Point file, .mp3 for Songs, .mov,. mpeg, .3gp, .mp4 for movies, etc.,

2. Skill of Understanding Suitable Application Software/Program/Packages: "There is no single technological solution that applies for every teacher, every course, or every view of teaching" (Mishra and Koehler 2006, 1029). This skill is required for handling productive tools in the education process. Selecting suitable Application Software/Program/Packages like Word for preparing document, Power point for presentation, Excel for developing spreadsheet, Windows movie maker for video and audio editing to prepare E-learning contents, Paint, etc., solves half the problems in developing it. For example, Kidspiration is a visual learning tool (software). It helps teacher educators and student teachers to develop confidence as they learn to organize information, understand concepts, connections stories, and express and share their thoughts. There are a number of tools that can deliver the high-tech, heavily contextualised, on-demand information and rapid communication that educators require (Oblinger & Oblinger 2005), and that can thus be used as next-generation e-learning tools.Suitable electronic educational games shortly called as e-edu games should be identified if exist or developed to make learning at leisure, interesting and playful.

3. Skill of Working with Document, Spreadsheet, Slide presentation and Database: The major components in working with the productive tools are as listed below.

Components: Manipulate, Page Layout, Create& Design, Insert, Store, Modify, Retrieve, Print, Scan, Search, Customizing Toolbars, Add-Ins, Import, Export, Publish and Encrypting. Minimum working knowledge in spreadsheet and database is required for every teacher educators and student teachers for calculating class average, median, standard deviation, ranking, grading, correlation, grouping and storing information.Training the skills in above said components helps the teacher educators and student teacher to maximize the modality effect.

4. Skill of Handling External & Modern Gadget: Eg.: Printer, Scanner, USB drives, Digital Still & Video Camera, 3G & 4G Smart Phones, iPods, LCD, etc., This skill emphasis the method of handling modern gadgets to support educational process.For example, Podcasting is a new method of communication allowing anyone to create audio files and post them to the internet for others to download and listen to at any time. These audio files can be downloaded to a personal computer or handheld device such as an iPod.YouTube provides the facility to upload and download videos captured using the gadgets and share it for educational purposes.

5. Skill of Troubleshooting: Basic knowledge on troubleshooting in computers is essential for all teachers, student teacher and learners. Software troubleshooting and Hardware troubleshooting are two types of troubleshooting. Some software-related issues are programs that lock up, printers that suddenly won't print, unable to open word and other format files, burning cd's related issues, fonts not found, frequent hanging or freezing of PC and other related to the operation of software, etc.,.Some hardware related issues are computers that won't boot, frequent auto restart, confusing error messages, audio not available, etc. It is the hardest problem-solving task in PC. Henceskill of some basic troubleshooting is required for teachers, student teachers and learners.

6. Skill of Computer System Management:

Components:

- ✓ Software management: It deals with the installation and updating of softwares.

- ✓ Hardware management: It deals with the hardware installation. Installing CPU hardware is least important for a teacher educator as it is technical; rather some basic knowledge on installing and working with external gadgets and other devices supporting the PC are of most importance.
- ✓ Anti-virus and anti-malware management. It plays a major role in the speed and performance of a computer by preventing unexpected corruption.

7. Skill of Developing Educational Multimedia Courseware / E – Content / On-Line & Off- Line Testing: E-content preparation is the recent development for learning beyond the wall of a classroom. Next-generation e-learning is a term used to refer to e-learning characterised by networked applications and high-bandwidth access, rich streaming media and synchronous Live Virtual Classrooms (LVCs) accessible over the web (Hernandez 2006). It is learner-focussed rather than teacher-focussed and offers a high level of engagement and interactivity. E-contents and multimedia course wares can be developed in 2dimensional or 3 dimensional. It includes educational modules, web page, software, e-games, etc., Every teacher educators and student teachers shall be equipped with some basic skills likeselecting and placing pictures, graphs, clip arts and smart arts along with text in the appropriate position in slide, webpage, or document etc., and require minimum skills in designing and developing educational multimedia courseware / e – content / on-line & off- line evaluation.

8. Skill of Evaluating Educational Software / Program/ Packages / Web Page / E-Content / On-Line & Off- Line Testing / Educational Games: Majority of the educational soft wares/ Program / Packages / Web Page / E-Content / On-Line & Off-Line Testing have no quality indicators. There is consequently the need for many more such studies and research into what constitutes quality software (Presby, 2001). The information contained within a piece of educational software is the first parameter that should be evaluated. (Netskills, 2000; NCPD, 2000).Software evaluation can be either formative or summative (Troutner, 2002). The skills for evaluating a educational software / program / packages / web page / e-content / on-line & off- line testing / educational games is mandatory for every teacher and teacher educator to ensure the quality and objectivity.There are even fewer reviews and evaluations which includethe comments of students (Squire & McDougall, 1994; Wilson, 2000; Liaupsin, 2002).

9. Skill of Administrating Computers in Network/Laboratory and Using Social Network Tools: The next few years will encompass the significant impact of broadband and wireless (WiFi).Some of the uses of computer networks in education arevirtual classroom, video conferencing, file sharing, communication, printer sharing, organization, collaborative learning, etc., Internet will be one of the vital network that every Schools, Colleges and Universities will use for teaching and learning process. Few educational institutions have already enabled with WiFi broad band internet and intranet access with firewall to exchange lessons through e-learning. Every teacher's andteacher educators should get trained with skills in using computers for effective knowledge transformation process using ICT in a network and solve elementary problems. Boyd & Ellison (2007) define social networking tools as "web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) create a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system. Dalsgaard (2006) argues that social networking tools are ideal to support the interactive and constructivist approach to learning. Some of the social network tool used today by educators around the world areFace book, Blogging, Micro blogging**,** Twitter, etc. A Twitter makes it easy to communicate anywhere and at any time, to

organise meetings, broadcast important information (e.g. changed deadlines for assignments), share ideas and resources (e.g. links to useful websites), request resources, provide a backchannel for communication during formal teaching and learning (Young 2009), or simply to develop relationships or provide one another with moral support for teacher and learners. It is being actively used by educators in teaching and learning, both at a secondary level (University of Minnesota 2009) and a tertiary level (Holotescu & Grosseck 2008a, Holotescu & Grosseck 2008b, Smith 2009, Rankin 2009).

10. Skill of Using Internet, e-Games, e-Puzzles, Video Conferencing, Satellite and Virtual Technology for Teaching Learning Process: The Internet is a treasure chest of fun interactive programs designed to improve child's reading skills, complete math problems, build memory, or simply enhance hand-eye coordination.A report titled "Harnessing the Power of Videogames for Learning" from the 2006 Summit on Educational Games by the Federation of American Scientists found that: "Students remember only 10 percent of what they read; 20 percent of what they hear; 30 percent if they see visuals related to what they hear; 50 percent if they watch someone do something while explaining it; but almost 90 percent if they do the job themselves, even if only as a simulation." In this context, skill of using Internet,E-Games, E-puzzles, Video Conferencing, Satellite and Virtual Technology for effective teaching learning processis important for every teachers and teacher educators.Accessible over the Internet, Live Virtual Classrooms combine the benefits of traditional face-to-face classroom learning with the sophistication of Internet technologies such as video streaming and Voice over Internet Protocol (VoIP) (Van Dam 2004). The above recommended ten skills can be practiced for different branches of education and atdifferent levels in education.Of all these ten skills, skill numbered 2, 3, 7 & 8 are software based skills, skills numbered 4 is hardware based skill and the remaining skills are both hardware and software based. Out of ten above mentioned skills, the basic skills to be acquired are,

- ✓ Skill of Working with Document, Spreadsheet, Slide presentation and Database
- ✓ Skill of handling External & Modern gadget. (Eg.: Printer, Scanner, USB hub, Digital Still & Video Camera, 3G & 4G Smart Phones, etc.,
- ✓ Skill of Computer System Management and
- ✓ Skill of using Internet.

The skills numbered 7, 8, 9 and 10 in the recommendations are higher order skills and the remaining are lower order skills to practice.The recommendation other than practicing the 10 ICT skills is periodically organizing skill development programmes / workshops to update the recent innovations and its applications in the use of ICTin teaching learning process.

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