USE OF ICT IN EDUCATION

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1.0 Introduction

School and Colleges are facing a period of great pressure to review and adapt their services to meet the needs of the changing world. The Indian Institutions are currently preparing students for jobs that exist today and not for the jobs that don't yet exist and that will use technologies that haven't yet been invented. The top jobs that are in demand today did not even exist in 2008.

Traditional colleges have already been threatened by the burgeoning 'knowledge business', where corporate universities and privately funded institutions have successfully competed for the lucrative student market.

1.1 How to deal with such a situation?

Information and Communication Technologies (ICT) have the potentail to create flexible learing paths, to break down the walls of the schools and colleges, to facilitate resercher and student mobility and to simulate international collaboration. Institutions are increasingly developing and making use of what we refer to as ICT enabled campuses – managed initiatives in technology enhanced learning with the objective of lifelong learning.

Why there is a need for creating a virtual learning space?

- To address the changing and demanding learning preferences such as demand-driven-education & education-at-ease (anything as per their requirements, at their own convenience, anytime and anywhere, with customized, interactive and self paced learning).
- To keep pace with technological advancements such as IT and computer revolution, growing presence of Internet and cyberspace.
- To fulfill the increasing and diverse learning needs.
- To cater to the huge educational supply pressure.
- There is a paradigm shift in pedagogical principles & practices

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such as; Teacher centric to learner centric; Individual learning to co-operative, collaborative & participatory learning; Expository learning to discovery learning; Linear to non linear approach in learning.

- To satisfy the varied learning styles of the learners.
- To manage the excessive knowledge explosion.
- Due to the influence of knowledge based society & economy.
- Due to emerging learning trends in open & distance learning, e-learning and virtual learning.
- Increasing demand for on line learning due to inconvenience in attending the regular courses.
- Because of more awareness and clarity for education attainment amongst students.
- And lastly, due to its cost effectiveness.

2.0 The Concept of ICT in Education

The term 'ICT in Education' characterizes a path that provides education and its learning opportunity through a well architected web-portal on the Internet, using computer programming and multimedia technologies to deliver its virtual classes, course modules, interactive tutorials, online simulation and virtual reality application to support lab and experimental work, assignments, and finally assessment, examination and certification.

3.0 Generic Elements of Successful ICT enabled Campus

- **Flexibility in delivery:** Learners must be provided both asynchronous and synchronous delivery systems and environments. ICT must allow students to work at their own pace, at their own time.
- **Learner's friendly technology:** As the system of delivery is flexible, so the technology used to deliver the learning must be as learner's friendly as possible. This means that the student does not need to be a technician in order to use materials and environments provided by the Virtual Campus.
- **Redefining Pedagogy:** There is no point in transposing traditional models of teaching to virtual environments without considering the pedagogical implications. Staff will need advance pedagogic

training to deal with new systems of delivery; and instructional design training for the creation of e-materials.

- **Learners support mechanisms:** Strong systems of support will be necessary for all aspects of use of ICT.
- **Appropriate software infrastructure:** The software should include flexible material design tools and elements of these should be easily understood by a fairly non-technical audience. Any design tools should support the facility to easily change or re-use course modules, and should be able to incorporate the Instructional Management Systems (**IMS)**or a widely accepted equivalent. The software should also have appropriate tools for management of the Complete Education process. These should include course management tools such as student grading and tracking, assessment tools, online quizzes, and perhaps even teacher tracking.
- **Robust hardware infrastructure:** ICT enabled Educational Campuses cannot afford to be offline. Institutions must be prepared to spend money to establish a reliable hardware setup, and continue to support the ongoing costs of repairs and updates for equipment as well as back-up methods of delivery.
- **Assessment methodologies:** Institutions need to ensure that assessment processes are practical and easy to follow. Software utilized should allow easy tracking of students and flexible statistical manipulation. Prompt response times for student assessment is particularly important for a remote audience.
- **Adequate legal policies and procedures:** There are a host of legal issues that relate to use of ICT in Education. These include the issues of copyright of materials, as well as intellectual property rights. This will encourage staff to expand and improve their work. There are also security issues in terms of protecting online materials.
- **Computer & IT training for staff:** Institutions need to establish a model 'set' of skills that staff should have in order to contribute to and participate in the ICT enabled Campus. Computer and IT training should be provided to the staff to adapt to the virtual

environments.

3.1 Elements of ICT enabled Campus and Prerequisites

Elements	Pre-requisites
Creation of teaching material	Video Studio, Virtual Studio, Resources and course development team
Delivery Mechanism	Video conferencing, Web conferencing, Streaming Media, Web based system
Certification	Web based examination and certification system
Management (Man, Machine and Resource management)	Campus Management System
Partnerships & collaboration	Forming a consortium
Feedback	Web based (input) feedback form
Research	Research and Advisory services
Quality Assurance	Quality assurance system

4.0 Requirements for e-learning in ICT enabled Campus

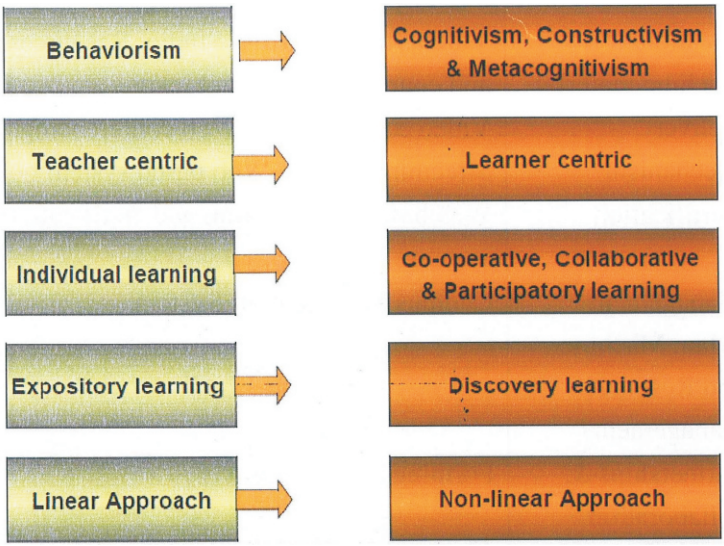
- Pedagogy
- Content/Course development
- Delivery
- Infrastructure

4.1 Pedagogy

Pedagogy refers to teaching actions, strategies and methodologies and Interactions with students that promote learning and achievement. This is to be done through the use of advanced technology in classrooms to extend and enhance learning. Good Pedagogy always tries to identify the resistance elements between teacher and taught and removes it.

4.1.1 Paradigm shift in pedagogy

The below picture shows that there is a paradigm shift taking place in the way the reaching shall be done in future-



The need is to make the learning student centric and adapt the teaching style to the learning styles of the various types of learners. The various Learners' types and e-teaching style suiting to each learners type is –

Learner Type	E-Teaching Style
Active Learners	e-Assignments, practicals & experiments through simulation, virtual reality(VR) applications, & 3D visualization labs which promotes action.
Reflective Learners	Theory, principle by e-books, e-glossary, virtual classes, group discussion by discussion board, blogs, e-groups; which promotes thought processing.
Sensing Learners	Concrete content in any e-learning form which enforces facts & memorizing like e- books, open educational resource (OER), open courseware & digital library.

Intuitive Learners	Case study, simulation & interactive multimedia tutorials that enable discovering the possibilities.
Visual Learners	Pictures, images, videos & modules, animations, graphics, illustrations, diagrams, PPT & other such kind of visual presentations.
Verbal learners	Audio lectures, e-books & text.
Inductive Learners	Induct the learning with outcome of a theory & principle by simulation or 3Dvisualization labs then proceed to the explanation of that underlying concept of principle & theory by web based lectures and modules.
Deductive Learners	Deduct the learning from principles & working down to its consequences &applications by web based lectures followed by simulations & VR.
Sequential Learners	Content delivery in step by step sequence with linking the concepts in alinear fashion by virtual classroom, web based lectures and e-books.
Global Learners	Interactive tutorials & e-content mode that is customized, personalized &nonlinear manner; offers learner whatever they want at that point of time.

The Learning Management System shall be able to assess which type of leaner a student is accordingly design the content delivery for him.

4.2 Content generation

- All content should have fairly large share of Visuals, Video and Audio inputs to make it effective. Visual and auditory stimulation should be used to create greater mental efficiency, more rapid information processing to achieve peak performance state.
- Content should provide a room for group activities which promotes activity and interactivity.
- The content should be useful to the students not only in terms of knowledge but it should help them to get marks and compete for jobs.
- One problem faced with e-learning environment is that it addresses to a large number of students having a large variation in IQ. In such

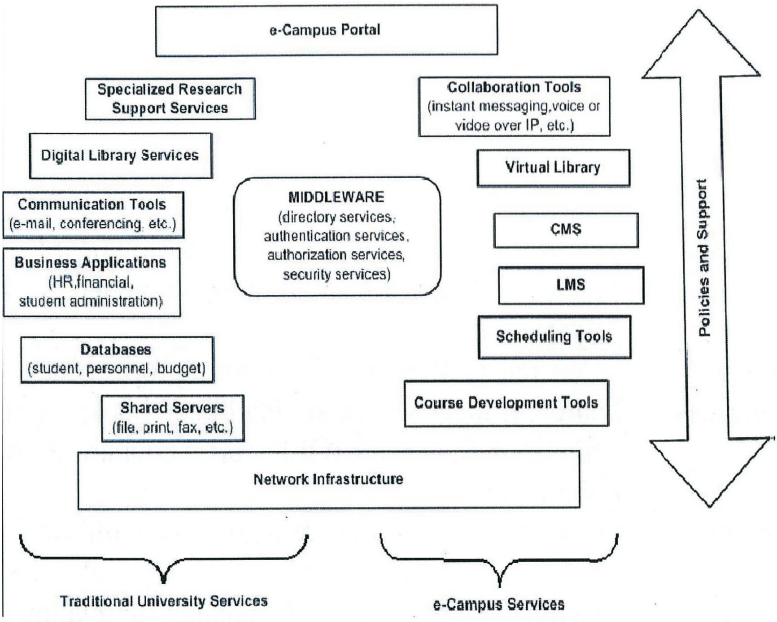
cases fixing the level of content is a difficult task. This is somewhat dealt through Examination system in which student, falling in a narrow band of IQ, are selected.

- While developing the content, it should made flexible, expandable so that it becomes easily adaptable to students having different IQ levels and learning pathways.

4.3 Delivery and Infra structural requirements for Virtual Campus

"DELIVERY" is most important as it controls Memory retention and recall (MRR).

Following diagram depicts the infrastructure required to establish the Virtual Campus



4.4.1 Teaching - learning tools required in Virtual Campus environment

- e-books and digital library
- Web based lecture
- Open Educational Resources(OER), NPTEL and Open Courseware(OCW)

- Wikis
- Virtual Classroom by video/tele/web-conferencing, and educational Broadcasting/ telecasting
- Audio-video modules, lecture-on-demand
- Interactive media rich tutorials
- Learning Objects and Repositories
- e-content
- Blogs
- Discussion board, chat room, e-groups
- FAQ, glossary, case studies, learning games, PPT, animations, images, assignments, quiz, references & recommended web links.
- Downloading of content
- Simulators, 3D visualization labs and Virtual Reality applications.

4.3.2 Infrastructure required for ICT enabled Campus implementation

- Internet network with wi-fi enabled
- ICT infrastructure
- Media Servers, video servers, data servers and application servers.
- Proper network architecture & design along with certain protocols; database management technology; learning management systems (LMS);course Management System(CMS); open source software like eduCommons& Moodle; rich internet application technology like AJAX, Flex Builder & open Lazlo; and standards such as SCORM,IMS, Dublin Core, CanCore, IEEE, AICC, CMI.
- Streaming media technology and multimedia development platforms
- Video studio with production equipments like camera, lighting, m'phones, vision mixers, sound mixers, editing systems etc.
- Examination centres as well as internet enabled examination on wheel for creating mobile examination centre at remote

places.

- Course development team
- ICT and IT training
- Programming team
- Quality assurance system
- Assessment, evaluation and certification wing

A centralized data center should be created.

5.0 Conclusions

Benefits could be derived for all those involved, i.e. students, staff and institutions. Students could benefit in that virtual environments may be more learner-centred, enabling a wider population to access cost effective and flexible courses that are strongly linked to industry or professional organisations, while being endorsed by creditable educational institutions

Faculty could gain new skills in an environment where they can have greater insights into how their students, who may be more motivated than in other situations, learn and interact with their environment. Additionally, streamlined assessment and other administrative procedures may reduce the less enjoyable aspects of teaching and learning

The institution will be able to exploit niche market opportunities while no longer being bound by geographical location. In fact boundaries in other areas will also be reduced. The successful (and even if not) universities no longer need to limit their course instruction to their own staff. They can utilize elements chosen from a worldwide selection - from Oxford University, to MIT and offer their own course elements for integration with others' courses. The common interface presented by the Virtual Campus will enable streamlined access to applications and focus the work of institutions on learning.

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