ICT IN UNIVERSITIES OF THE WESTERN HIMALAYAN REGION IN INDIA: Performance Analysis

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ABSTRACT

The paper presents a comparative analysis of a live project study carried out to understand the impact and performance of ICT initiatives taken by the Universities located in the Western Himalayan Region of India. A basic four-tier framework has been used to carry out this study. Accordingly, a pre- structured questionnaire on ICT initiatives, status and accomplishments, 117 questions divided in 18 groups, was prepared and given to the Head of the Department (HOD) of ICT in the Universities, who along with his technical team, supplied the feedback on a five- point scale. In each of the groups, one question was related to performance (as performance indicator) which was identified and thus another special group 'S' was created with 18 responses.

In order to assess the respective performance and impact, a standard statistical analysis was carried out in terms of the weighted mean and the correlation (Pearson's) coefficient (CC). The findings of the study are:

- **A dynamic academic leadership and a properly trained skilled human resource yield better performance and impact leading to effective problem solving capability, research output and actual placements. This aspect is being implemented in most of the universities effectively and the performance is found to vary from one to another university**
- **For most of the groups the CC, with the 'S' group, was found to be significant, indicating a positive ICT- based performance in the universities (iii) The universities, to a greater extent, have been found to act as nuclei towards creating skilled professionals with enhanced core competence.**

Keywords: **Information and Communication Technology (ICT), Initiative, Status, assessment, performance, efficiency, Impact of ICT.**

INTRODUCTION

During the past decade, Information and Communication Technology (ICT) has taken rapid strides in the field of higher education in various Universities and Institutions of higher learning across the length and breadth of India.

Such a transformation was triggered by the developments in microwaves communication followed by powerful computer systems, VSAT/ internet connectivity and optical fiber communication. Broadband communication which consists of technologies and equipments required to deliver packet- based digital voice, video and data services on-line and at high speed, has facilitated progress in this direction. Further, the broadband access technologies are being deployed to address the bandwidth problem so as to provide virtual environment of work places to end users.

This has been accelerated by various initiatives of Government of India through UG-Infonet to connect various institutes and universities. Its pervasiveness has made inroads both in laboratories and class rooms.

The impetus at the national level was set in motion by the recommendations of Task Force 'Technology Information Forecasting and Assessment Council' (TIFAC), for Technology Vision 2020. One of the important pilot documents "India 2020, A Vision for the New Millennium" (1998) prepared by TIFAC, under the leadership of Dr. A.P.J. Kalam, provided a blueprint of the Technology Vision for India. According to this document, ICT can enhance skills in critical thinking, information handling, and level of perception, problem solving capability and adding value to research in higher educational institutions. This document particularly underlined the importance of higher educational institutions/universities as agents to take prompt and appropriate initiatives in this direction this also gave further direction for planning ICT strategies in which the role of higher educational institutions in India can be networked to achieve criticality. The document emphasized that the Indian human resource has great learning capabilities which, with a core competence in technology, can lead to spirit of entrepreneurship and competitiveness. It strongly advocated the synergy between development of human resource cadre (Sadagopan 1998) and the role of higher educational institutions, a cornerstone of knowledge economy and technological advancement.

This document prompted the Government of India to take a major ICT initiative to lay down the ICT policy for the country. This is reflected in the planning and implementation of ICT in the field of higher education by the Ministry of Human Resource Development (MHRD), Government of India, at various levels since 1998. Simultaneously, at the national level, it is being implemented vigorously in the form of e-governance which is being coordinated by National Informatics Centers (NIC). Latest telecommunication policy, (Tandon, 2007), has been extremely helpful in implementing this ICT policy. At the institutional level, University Grants Commission (UGC), All India Council of Technical Education (AICTE), Department of Science & Technology (DST), Department of Atomic Energy (DAE), Indian Council of Agricultural Research (ICAR) are also encouraging higher educational institutions to move in this direction.

In Jan. 2009, the Cabinet Committee on Economic Affairs, Government of India, approved a new scheme 'National Mission on Education through Information and Communication Technology' (NMEICT), submitted by the Ministry of HRD for the 11th Five Year Plan. This mission has envisaged to raise the potential of ICT by providing high quality modules (personalized and interactive), for all the learners as one stop solution in 'any time any where mode'. It has to ensure an effective on-line access to all the ICT resources viz. connectivity, e-content in the form of digital lectures, static documentation and availability of virtual laboratories for exploration, to more than 18,000 colleges and 425 Universities of the country. Effort of the mission is to bridge the digital divide between the haves and have-nots. There has been another apex body, National Association of Software and Services Companies (NASSCOM), in the field of ICT, dealing with the ICT infrastructure, research & development and trade since 1988.

According to its recent report (Strategic Review, 2009), it has been emphasized that availability of skilled and employable talent is the responsibility of universities and higher educational institutions.

In order to achieve this, concentrated effort to elevate talent and quality are needed from all the concerned quarters namely the government, the academia and the industry. The role of academia is supposed to be very critical in setting up research laboratories. Specific initiatives like faculty development program, upgrading the curriculum, launching internship programs and academia- industry collaboration have been proposed which would help to bridge the gap towards the development of talent. It is being felt that this has resulted in enhancing the reach of all the stake holders to knowledge resources which in turn is likely to have an impact on creation of knowledge as well.

This body is a partner with the Government of India and various State Governments of the country to encourage percolation of ICT. It has also played a crucial role in the formulation of ICT policies which endeavors to narrow down the digital divide in the country and has paved the way for all citizens to enjoy the benefits of ICT. NASSCOM has been particularly interested in the ICT- business process outsourcing (ICT-BPO) industry in India, which has become a major job provider and has led to growing economy of the country. It provided a feedback to Government of India modulating the ICT policies and programs from time to time.

At the International level, UNESCO (2007-08) has prepared a document for Asia– Pacific countries, for the implementation of ICT programs (Roy and Raitt 2003) through the higher educational/ research institutions. In this document, various ICT strategies supporting the core areas viz. learning, teaching (Kulik and Kulik, 1991 and Resta, 2002), training programs and research, driving the higher education towards excellence, have been suggested. Very recently, special issue of International Journal of Education and Development using ICT, brought out an editorial by Dirckinck- Holmfeld (2009), on innovation of 'Problem Based Learning' (PBL) through ICT, which emphasized on the ICT based transformation within a framework of three core themes: PBL & pedagogical principles, inquiry based learning characteristics of ICT and intercultural perspectives. The theme of PBL and Problem Oriented Project Pedagogy (POPP) have a long tradition within a university system in teaching & learning along- with international collaboration. This theme provides a direction for critical pedagogy and research oriented approaches where students have to undergo through different stages of systematic investigations. This approach further supports the development of competencies and skills towards interdisciplinary thinking and solving serious problems. ICT has supported PBL approach in new ways leading to some interesting and dramatic consequences.

All these innovative ideas could diffuse using the framework provided by ICT. It seems that diffusion and adoption of the latest information and communication technology are making all the difference particularly in the universities. During the last decade there have been several attempts to understand information technology diffusion. The concept of diffusion, at the empirical level, was reviewed by Fichman in 1992. He dwelled upon innovation diffusion theory and, in particular, how to improve technology assessment, adoption and implementation. A framework was discussed in terms of classical diffusion which was adopted by individuals and organizations.

For the latter, he discussed about achieving critical mass beyond which the innovation is universally adopted. A lot of other important scientific works exist on the diffusion of innovation and its adoption, given by Attewell (1992), Rogers (1995), Farquhar & Surry (1994), Anderson et al (1998), Fichman (2000) and Wilson et al (2000).

Attewell (1992) placed the work on diffusion in two categories:

- **Adoption studies and**
- **Macro diffusion studies.**

The former is primarily concerned with understanding of innovations and its assimilation during a time of adoption. The latter is concerned with pattern of technology adoption. This type of work was understood in terms of mathematical models of the diffusion process by Mahajan & Peterson (1985) and Mahajan et al. (1990). Rogers (1995) in his book on Innovation Diffusion has presented a significant general frame work which became the basis for the later work. Another mathematical approach for this innovation diffusion was developed by Karmeshu & Pathria (1980), Lal et al (1988), Karmeshu et al (1992) and by Karmeshu & Jain (1995).

In recent years, a very significant work on 'Global Diffusion of the Internet' by Wolcott and Goodman (2003) appeared in Indian context. They presented a vision of new India as a measure of IT power, fully integrated with a global economy. The key to this vision was obviously the internet for enabling the technology based changes. They provided an analytical framework which broadly consisted of dimensions and determinants.

Dimensions contained six variables namely organizational infrastructure, geographic dispersion, connectivity infrastructure, pervasiveness, sectoral absorption and sophistication of use. These variables are supposed to capture the state of internet within a country at a given point of time. Each of these variables was judged at five different levels. Determinants represent various factors to understand the observation of the 'state'. They further elaborated on distinctive features of the internet in India for a continued dynamic growth in three steps:

- **The government policy**
- **The nature of relationship between the government, the state-owned & private telecommunications service providers as a critical variable**
- **The policy makers try to strike a balance between the interest of individuals and those of the society.**

Later, this framework was applied usefully to understand the initiative, status and performance in Ghana by Foster et al (2004), in Togo by Bernstien and Goodman (2005), and in Kenya by Ochara et al (2008).

In view of the above ICT- based initiatives, most of the universities and higher educational institutions have adopted the latest technology and implemented it productively, for the development of skilled human resource in respective area of specialization, as part of their responsibility. These programs have been going on for the last decade or so. At this stage, one may ask a question: how much different the performance of the university system has become as compared to that without the ICT technology decade ago? An assessment of the overall performance and efficiency based on ICT infrastructure/activities, are essential particularly for deciding the future ICT strategies at the respective levels. Basically, this formed the basis of the motivation to undertake a comparative study of the ICT vision and planning, infrastructure and academic accomplishments in various universities of the western Himalayan region of the country using standard statistical methods. The University Grants Commission (UGC), New Delhi, took steps to establish an autonomous institution, National Assessment and Accreditation Council (NAAC), to undertake comprehensive assessment of the various universities in this region and to rank them.

NAAC (2007) has developed a framework for higher education based on the promotion and sustenance of quality of teaching- learning, research and training programs. Their most significant core value is quest for excellence/ innovations using the latest technological trends and fostering global competence among students. They have devised seven assessment criteria namely, curricular, teaching- learning, research and application, innovation, infrastructure, student support and leadership/ governance aspects to capture the micro- level quality indicators by using differential weightages. Times of India group (TOI, 2007) also tried to assess independently various agriculture, horticulture and technical institutions. Their recommendations and respective gradations are available at the national level. This information may be utilized for comparison with the findings of this paper in the context of ICT.

Recently, Mokhtar et al (2007) gave a framework for assessment (academic computing) of Malaysian colleges in respect of ICT-based accomplishments, within which they tried to answer three fundamental questions regarding

- **the indicators for assessment,**
- **the characteristics of performance and**
- **the academic performance.**

They adopted a value chain concept originally proposed by Porter (1985). This framework had two parts as primary and support activities. The primary activities included ICT-based learning, teaching, research and training as the core service and then enhancing the value in each. It further included remote access to data, faster and precise data processing, simulation of complex systems, and collaboration between research groups. The support activities were linked with primary activities to improve the ICT-based efficiency and standards. Their finding was the moderate to high ICT- based academic performance in Malaysian colleges, which was corroborated later by Bakar & Mohamed (2008). This study was having some limitations as it was carried out for Malaysian colleges only and not for the universities and higher educational institutions of training and research.

However, the work provided the inspiration to authors to devise a suitable framework for universities/ higher educational institutions and undertake the task of assessment in such institutions.

In this study we plan to assess the performance of universities of western Himalayan region in India, which has intricate topography where people have to really struggle for livelihood, health and education. In view of this, the Government of India is paying special attention to alleviate the level of education in this region using the full potential of ICT in this direction.

Keeping this in view, a slightly different framework is required to assess the initiative, status and accomplishment of the universities in this region "Initiative" will imply vision and planning of the ICT programs in the universities. The "status" would mean complete ICT infrastructure including local area network (LAN) facility, internet- network security, mobile computing access, system application software, and website and information system, teaching display technologies, ICT Technical staff and budget allocation, e- library, e-placement/alumni portal. "Accomplishments" will be related to the outcome of various ICT-based activities. It would include, apart from teaching and learning, the research at the conventional level and at the advanced level in the form of ICT training programs for the development of human resource with actual problem solving skills. Such an accomplishment is going to have an impact of ICT-based programs, functional in the universities, in the form of quality research publications and actual better placements of the outgoing students.

The reference period of the study has been the year 2009. The outline of the framework will be discussed explicitly in the next section.

BASIC FRAMEWORK

The basis of formulating the framework lies in the recommendations contained in the documents available at the national and international level, as described in the Introduction. The important building blocks are supposed to be the Performance Indicators (PI). One group of authors (Riley and Nuttall 1994) suggest that performance indicators must be quantitative, whereas the other group takes a wider view in favor of qualitative and descriptive statement for PI. The four-tier framework conceptualized is schematically represented in Figure 1.

Both these measures (ISO, 1998) quantitative as well as qualitative, will be used here. These procedures would allow us to have a complete view of the richness and diversity of the ICT based academic performance which would make it possible to assess and judge the effectiveness, efficiency and impact of an institution in terms of PIs and to make projection for future strategies.

This framework takes into consideration all the components present in universities/ higher educational Institutions which are primarily the centres of research where knowledge is created, shared and disseminated.

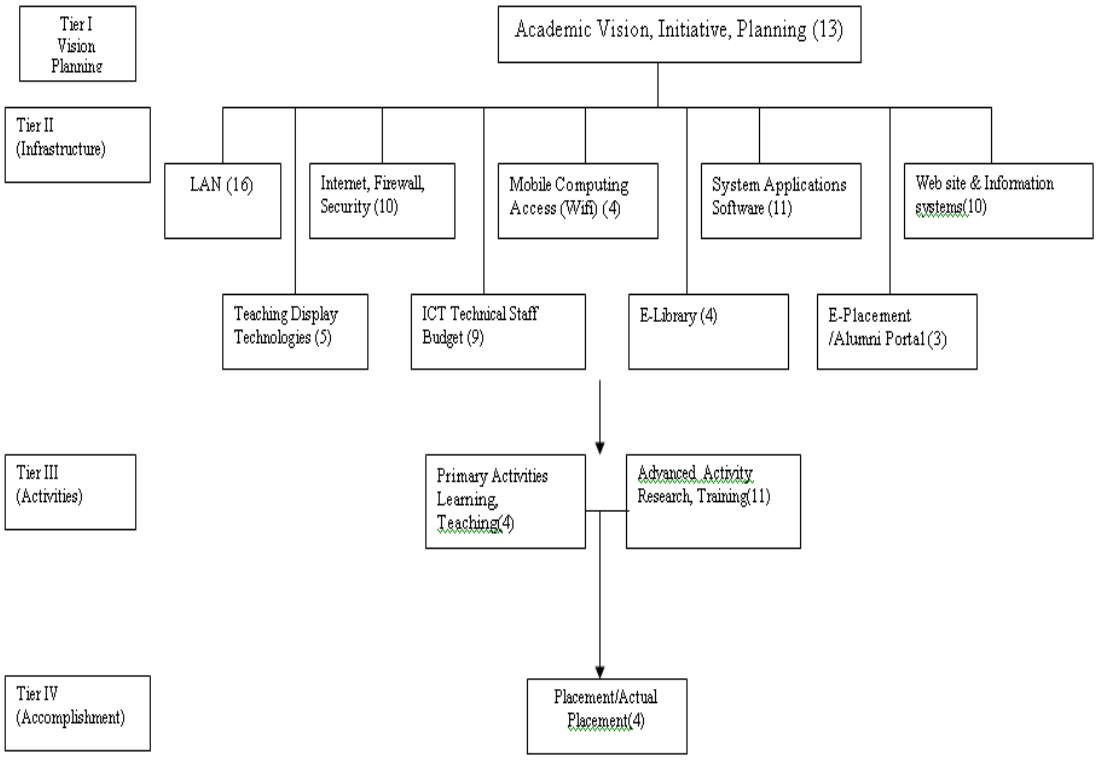

Figure: 1
Schematic representation of four tier framework. Boxes contain the main ICT components along with the number of questions in it

This figure containing the basic constituents of ICT, placed in the appropriate tiers, depict the different academic components of ICT and the related activities of a university. A questionnaire comprising 117 questions divided in 18 groups (A-R) were created to assess the initiative, status and accomplishment of the universities under investigation in accordance to the areas delineated in the framework. The items in the questionnaire are shown in Appendix A. Further, in each group of questions, the last question is related to the performance, but group the R has two questions related to performance. All these performance related questions (19) are placed in another group, S, which are presented in Table 1.

Table: 1
Various Groups of ICT Components in an Institution

S.No.	Group	ICT details at University level	Performance Indicators	No. of Questions	Tier in Framework
1.	A	ICT Vision	Implementation	03	
2	B	ICT Initiatives	Execution	04	Tier-I
3	C	ICT Planning	Achievement	06	
4.	D	ICT Infrastructure	Utilization	13	
5.	E	Local Area Networks Facility	Users	16	
6.	F	Internet, Network Security	Speed	10	
7	G	Mobile Computing access	Access 24x7 basis	04	Tier -
8.	H	System Applications S/W	Overall user's Satisfaction	11	II
9.	I	Web site and information systems	Online communication	09	
10.	J	Teaching Display Technologies	Availability	05	
11.	K	ICT Technical Staff	Trouble Shooting	05	
12.	L	ICT Budget allocation	Utilization	04	
13.	M	E- Library	Availability	04	
14.	N	E-Placement/Alumni Portal	Alumni Portal	03	
15.	O	ICT based Teaching and learning	Effective use of ICT	04	
16.	P	ICT Based research	Satisfaction level	07	Tier
17	Q	ICT Training programs	No. of programs organized	04	III
18.	R	Accomplishments	Placement /Research	04	Tier IV
19.	S	Performance	Success rate	19	

METHODOLOGY

The universities located in the western Himalayan region are those spreading over the state of Himachal Pradesh and Jammu & Kashmir. There are mainly 7 universities located in the western Himalayan Region of India, out of which six ICT based universities have been selected purposely as per details given in Table: 2.

Table: 2
Six ICT based Universities of western Himalayan region of India.

University	Abbreviation	State	Founded Year	Ownership	Website
Jammu University, Jammu	J. U. Jammu	Jammu and Kashmir	1969	State Government	http://www.jammuuniversity.in/
H.P University, Shimla	H. P. U, Shimla	Himachal Pradesh	1970	State Government	http://www.hpuniv.gov.in
C.S.K Agriculture University, Palampur	C. S. K .U Palampur	Himachal Pradesh	1978	State Government	http://hillagric.ernet.in
Y.S.Parmar University Nauni, Solan	Y. S. P. U. Nauni	Himachal Pradesh	1985	State Government.	http://www.yspuniversity.ac.in
National Institute of Technology (Deemed University) Hamirpur.	NIT, Hamirpur	Himachal Pradesh	1986	Central Govt. of India.	http://www.nitham.ac.in
J.P.University of Information Technology, Solan, H. P.	J. P. U, Solan	Himachal Pradesh	2002	Private	http://www.juit.ac.in

In order to gain information regarding ICT vision & initiative, status and accomplishment in each university, the questionnaire was given to the concerned Head of the Department (HOD) of ICT/IT/ Computer Science in the institution/University. Though the person chosen was deemed to have the complete knowledge regarding the development of ICT program, right from its inception, The HOD along- with his technical team gave the feedback which was gathered personally by one of the authors. In the structured questionnaire, the feedback to various queries was on five point scale arranged in a particular order that revealed the natural flow from the lowest level to the highest level, in technology. That is why it was thought reasonable to give a weight age of 1 to 5 respectively to each level in increasing order. The relevant statistical quantities were obtained as follows.

Weighted Mean

Standard statistical tools were used to analyze the data, groupwise, to find the Weighted Mean, Standard Deviation and Coefficient of Variation (CV) keeping in view the weight of respective level. The CV indicates the variation around its weighted mean in the series, the lesser is the CV, more consistent and stable is the series. However, the weighted mean was found to be a better measure as compared to CV, to understand the trend in a particular group. The use of median was another alternative but in view of the limitations of the median method, weighted mean was logically preferred. In view of the fact that queries were replied on a five point scale, The weighted mean (WM) of each group was calculated followed by an overall mean in the respective tier. For the weighted mean, a weight factor ($w_l/\Sigma w_l$) was assigned for the response (1) in a particular level ,l, where w_l represents the weight 1,2,3,4,5 for the levels (l= 1,2,3,4,5) respectively. After this, an overall mean was found for different groups and then for different universities. Thus a simple tabular analysis was carried out to find out results which are presented in Table: 3.

Performance

Performance may be defined as the active (not the passive) part of the process/ item. For example, take any item in either of the four tiers. As long as it remains in the mind or on the paper it is passive and it is not performance. The moment it is converted into action and becomes functional/fruitful/output oriented, that becomes performance. The performance was assessed as follows:

- **A performance related question, (PI), was identified from each of the first 18 groups. But from the group R two questions were identified for this. These 19 questions formed the nineteenth group 'S'.**
- **For each of the university, a statistical mean of the weighted values of 19 PIs was calculated.**
- **These mean values, given in the last row of Table 3, belonging to group S are shown in Figure 6a for different universities, depicting a performance analysis in Section 4.**

Correlation Coefficients

Another statistical quantity (Pearson) 'Coefficient of Correlation' of various groups (A to R) with the group S was obtained and given in the last column of Table 3 and displayed in Figure.6b of Section 4. It has been used to ascertain the confidence level in planning proper groupings incorporated in the structure of the questionnaire, as the correlation coefficients for most of the groups were found to be significant lying in the acceptable range (except three groups).

Table: 3

Weighted Mean and Pearson's Correlation Coefficients of various groups with Group S.

Tier		J.P.U Solan	NIT Hamirpur	CSK.U Palampur	J.U. Jammu	Y.S.P.U. Nauni	H.P.U, Shimla	Correlation coefficient
Tier I	Group A	0.3	0.33	0.17	0.3	0.27	0.33	0.60
	Group B	0.27	0.27	0.2	0.22	0.18	0.28	0.70
	Group C	0.29	0.28	0.21	0.21	0.24	0.32	0.48
Weighted. Mean		0.29	0.30	0.19	0.24	0.23	0.31	
Tier II	Group D	0.33	0.33	0.28	0.22	0.22	0.3	0.70
	Group E	0.32	0.33	0.21	0.23	0.24	0.2	0.93
	Group F	0.27	0.28	0.23	0.26	0.19	0.28	0.64
	Group G	0.2	0.29	0.23	0.24	0.17	0.17	0.60
	Group H	0.07	0.33	0.07	0.27	0.16	0.07	0.49
	Group I	0.24	0.24	0.16	0.18	0.19	0.19	0.93
	Group J	0.15	0.27	0.15	0.14	0.07	0.12	0.80
	Group K	0.24	0.33	0.18	0.16	0.13	0.18	0.92
	Group L	0.33	0.27	0.2	0.2	0.09	0.11	0.77
	Group M	0.23	0.33	0.23	0.2	0.23	0.17	0.71
	Group N	0.31	0.27	0.13	0.17	0.23	0.17	0.79
Weighted Mean		0.24	0.30	0.10	0.20	0.17	0.18	
Tier III	Group O	0.27	0.27	0.25	0.2	0.26	0.15	0.38
	Group P	0.2	0.27	0.07	0.18	0.07	0.23	0.95
	Group Q	0.2	0.2	0.09	0.12	0.07	0.08	0.91
Weighted Mean		0.22	0.25	0.14	0.17	0.13	0.15	
Tier IV (WM)	Group R	0.3	0.32	0.17	0.23	0.15	0.22	0.63
Performance Indicator(WM)	Group S	0.28	0.32	0.17	0.21	0.18	0.2	

RESULTS AND DISCUSSION

This section will be presented in two subsections as below:

Comparative Status of different Tiers (I-IV)

The weighted mean for Tier I, vision, initiative and planning, for different universities has been presented in Figure: 2, which depicts a comparative view among the universities.

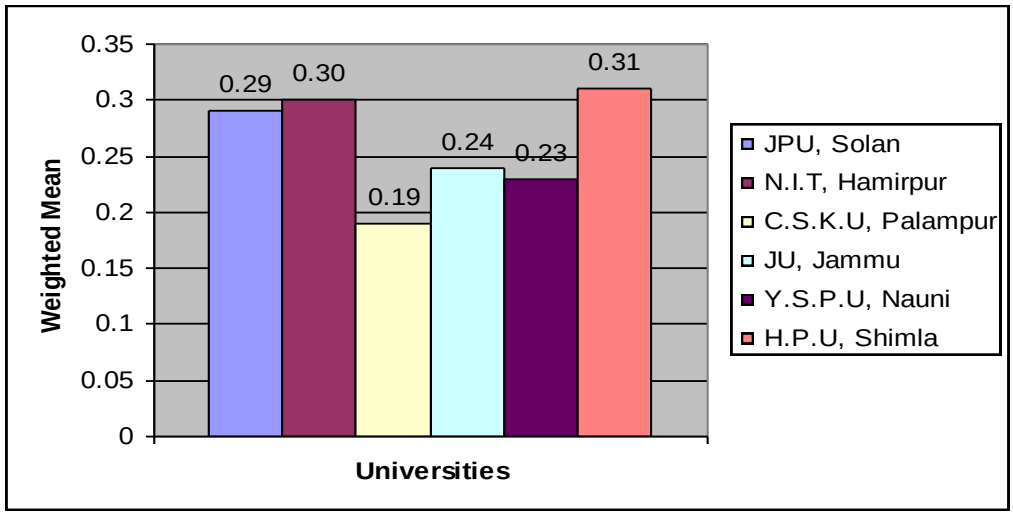

Figure: 2
(Tier I.) Status of ICT Vision, Initiative and Planning among different Universities.

Actually, at the level of Tier I, all the universities think big with a minor difference. It is only a matter of earlier or later ICT technologies adopted by the universities which normally makes a difference. Figure 2 shows that there is not much difference corresponding to the constituents of Tier I, among the three Universities viz. JP University, NIT and H.P.University. The other universities might have lagged behind due to earlier adoption of the technology, proper initiative or the vision in fixing the priorities in respective universities.

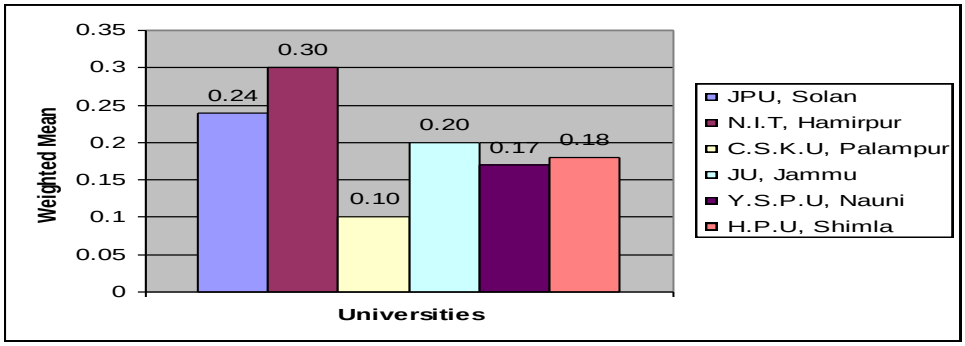

Figure: 3
(Tier II) Status of ICT Infrastructure among different Universities.

The standard deviation and the coefficient of variation (CV) were also calculated for Tier I. CV (%) was found to be 14.54%, 15.13%, 18.04%, 24.05, 32.66% and 39.44% respectively for H. P. University, J.P.University, NIT, Nauni University, Jammu University and Palampur University. It reveals that first three universities are having more consistency in ICT vision, initiative and planning than the later three universities.

Next, the weighted mean of all the different groups in Tier II, dealing with the overall ICT infrastructure among different Universities in the region, has been presented in Figure. 3. From this diagram, it may be seen that NIT Hamirpur is having the largest ICT infrastructure followed by J.P. University, Jammu University, H.P.University, Palampur University and Nauni University. This difference may be mainly attributed to advanced ICT facilities available in NIT, like Local Area Network with facilities of large bandwidth, Video-conferencing, Mobile (Wi-Fi) computing, IP telephony and assured access of the digital tools/ resources to all the users on the campus along-with a prompt maintenance management. These facilities are also available to students in the hostels and to faculty members at their official accommodation. At the same time, NIT has a functional & effective web site along-with the information system, better University- industry interaction. From all these counts, NIT has an edge over other universities. Other contributing factors are the effectiveness of ICT training programs, organized for the faculty, students and professionals as the drive for human resource development.

Finally, the placement of outgoing professionals in reputed establishments adds much more weightage in this direction. J. P. University (a private university) closely follows the NIT Hamirpur due to the availability of sufficient resources as per their priority.

This figure further reveals a small difference between Jammu University and Himachal Pradesh University, particularly because of the fact that Jammu University is having higher internet bandwidth, better mobile computing facilities, video-conferencing facility a long with e-library as compared to those available in Himachal Pradesh University. The difference may be attributed to the limitation of funding and technical faculty.

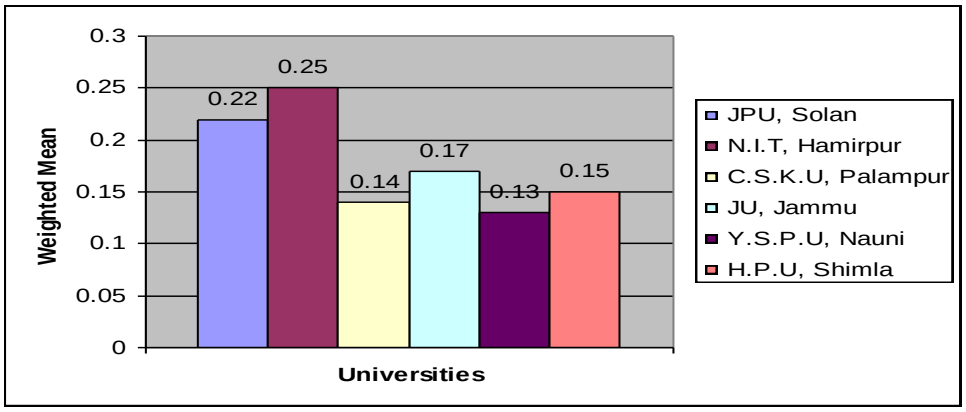

Figure: 4
(Tier III.) Status of ICT based activities aching/Learning/Research/Training among different universities

Tier III, is concerned with the IC- based academic activities which can be further divided into primary activities of teaching and learning, and advanced activities like sophisticated training programs with an orientation of actual problem solving & quality research for developing professional skills. These are displayed in Figure: 4.

The use of ICT- based tools is one of the effective approaches in organizing various academic activities. E-journals and internet resource has become the lifeline for the quality research work and for conducting the advanced training programs in the university system. In this respect, NIT Hamirpur has established superiority over others in Tier III also, followed by J. P. University, Jammu University, H. P. University, Palampur University and Nauni university.

The accomplishments leading to performance and impact of various universities at the local (societal) level, national and international level, falls under Tier IV. The performance & impact are reflected mainly through two components. One is the outstanding research supported with patents for the fruitful activities and for the benefit of mankind. Another is the placement of outgoing students trained in professional courses, to reputed universities, institutes, industries and other organizations. The accomplishment/impact factor has been shown in Figure: 5

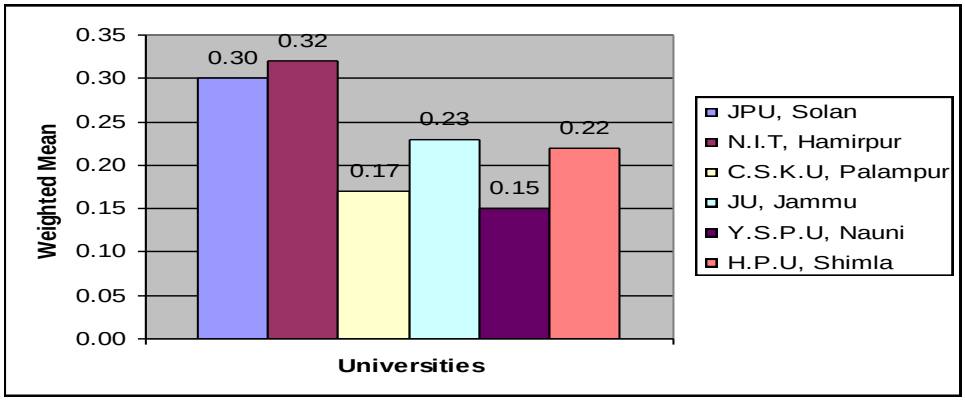

Figure: 5
(Tier IV) Status of ICT based accomplishment (Placement/Research)

This figure reveals that NIT Hamirpur is again having an edge over other universities in the western Himalayan region of India, followed by J.P.University, Jammu University and Himachal Pradesh University. The main reason for this variation is the value addition through adoption of innovations in the field of research, particularly supported by the advanced ICT-based facilities. Further, quality research publications per year, along with successful collaborative research work also become an important factor for the superiority of one university over the other. In addition, actual placement contributes the most to Tier IV in the form of linkages of the professionals with industries.

Impact may be judged by either of the two methods:

- **Present and past approach**
- **(ii) With and without approach.**

In this study, we try to judge the accomplishment by 'Present and past approach'. Earlier, one could not imagine the accessibility of most of the relevant journals to the academic community, particularly in the universities of this region having rough and difficult terrain with less resources, but now with the availability of the ICT-technology the e-material and e-Journals have become readily available, through the courtesy of University Grants Commission. With this, the academic interaction/communication and exposure of students & faculty members in the universities increased leaps and bounds which got reflected through quality publications in research and better placements of outgoing professionals.

In general, an output of a concern is judged by its quality and its demand (at the local and global level). These two aspects decide the impact of the concern. Adopting this analogy here, quality comes from, in addition to the development of skilled professionals, the enquiry- based learning & research based on problem solving. After all, the basic purpose of education is actual problem solving. This is how humanity progressed and survived. Further, the demand has its manifestation in placements of the outgoing students in reputed Indian/ multinational concerns including the software development sector.

There are other factors also that are indirectly responsible for the accomplishment, performance and impact of an institution, like increase in the number of universities/ higher educational institutions where innumerable programmes having better employability are being offered. All this became possible due to the revolution in the field of solid state devices (from the micro to nano), digitization of information and internet technology. Earlier, in the absence of ICT-programs, only a few higher educational institutions/universities could be counted as centres of excellence but in the post- ICT scenario, one can appreciate the presence of many such excellent higher educational institutions at the Global level.

Performance

This section would be further subdivided as follows.

- **ICT based Performance Analysis: Going back to Table 3, last row, group S, the weighted mean of the performance has been plotted in Figure. 6a. Here it may be noted that the maximum value of the weight corresponding to the level 5 (in the feedback), is 1/3. Now the figure reveals that NIT Hamirpur is very near to this maximum, followed by J. P. University with the performance in the range between 80 to 95%. Then comes the two general multifaceted universities namely Jammu University and H.P. University, having the performance in the range 60 to 70%, followed by the Agri- Horticulture universities having the performance in the range 50 to 60 %.**

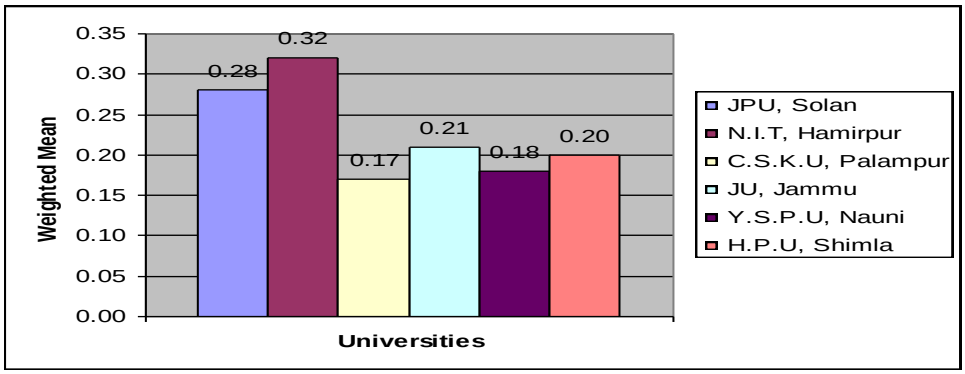

Figure: 6A
Performance Analysis

- **Correlation Coefficients: Towards the end, it was thought reasonable to compare Coefficient of Correlation of different groups with the group S (indicating the performance). These Correlation Coefficients have been given in the last column of Table: 3 and displayed in Figure: 6 b.**

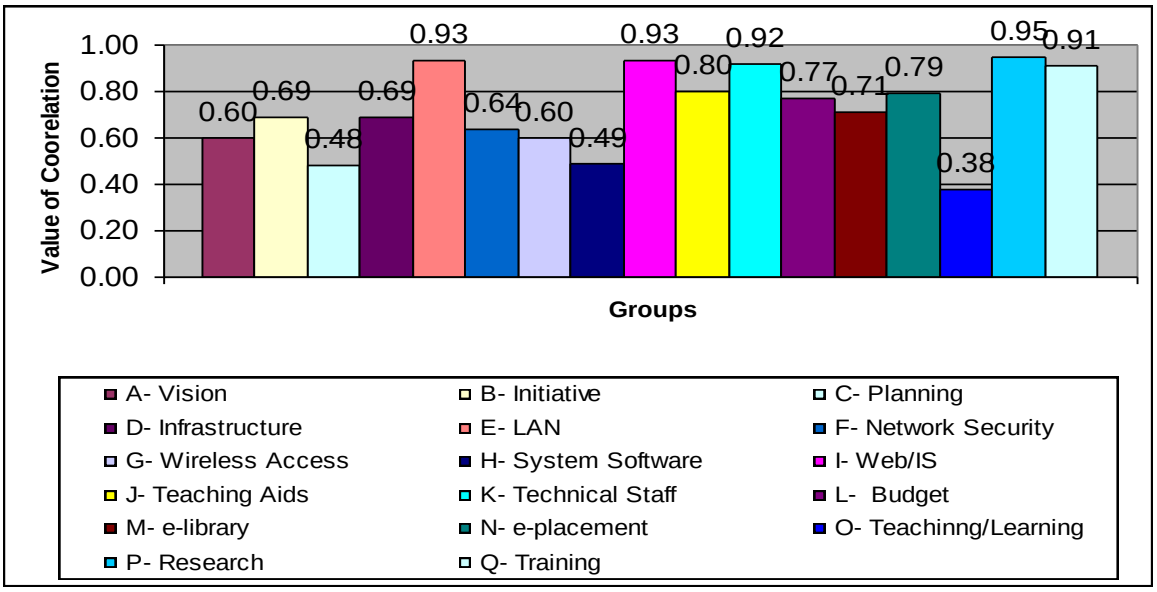

Figure: 6b
Groupwise Correlation with performance indicator Group S

On its perusal, the CCs are found to have positive correlation, varying between 0.38 and 0.95. Its value, greater than 0.90, was found for five groups. These groups are E- LAN, I- Website and Information System, K- technical staff, P- ICT based Research and Q- ICT Training programs, which is obvious due to the latest ICT facility being used in research and training programs and therefore a better correlation with the performance of an institution. This is found quite consistent with the analysis presented in section 4.1 above. The next five groups having CCs between 0.70- 0.89, are found to be due to D- ICT Infrastructure, J- Teaching Display Technologies, L- ICT Budget Allocation, M- e-Library and N- Alumni portal and placement. There is another set of five groups whose CCs vary between 0.6-0.69. These are found just acceptable and are related to A- ICT vision, B- initiative, F- internet & network security, G- mobile computing facility and R- accomplishments of ICT. The remaining three groups having correlation coefficients below 0.60 are not acceptable due to inadequate planning in ICT.

SUMMARY AND CONCLUSION

This section will be presented in two subsections.

Summary

In this study we have presented an assessment and analysis of ICT vision & planning, status of ICT infrastructure, ICT based academic activities and corresponding performance/success of six universities in the western Himalayan region. The focus was on the integration of ICT with the academic curricula of an institution.

The analysis was based on the primary data gathered as feedback to a questionnaire which had 117 questions divided into 18 different relevant groups within a four-tier framework. Statistical inferences were drawn from the weighted mean of various responses. Performance indicator of each of the groups was carefully identified to gauge the success of respective ICT initiative at different stages of the framework.The Tier I covered vision, planning and implementation which initially become the basis for decision- making and respective strategies.

These are always driven by a visionary at the highest level in the university system with full support from the government along with a small but dynamic team at the local level. It may also be emphasized that a good academic curriculum and better faculty are the most essential requirements for imparting the quality education in the field of ICT. The present analysis showed H. P. University to have an edge over others followed by NIT Hamirpur and J.P. University among the first three Universities.

It further requires superior infrastructure (Tier II) with an efficient and fast network to access the internet system along with a large bandwidth and good technical support for maintenance. This aspect in functional form gets reflected subsequently on the performance level of the university system. The analysis revealed that the technical support and redundancy problem was not taken care of in general with the exception of NIT Hamirpur and JP University. After all, the universities are meant (Tier III) to create knowledge by the professionally skilled dedicated manpower. The professional spirit of a person is always gauged on a scale of how much busy his academic schedule remains for assimilating knowledge towards actual problem solving. The findings of the analysis in respect of this category are that

- **Communication between students and faculty members using the ICT facility, is still not widespread in many of the universities except NIT Hamirpur and partly in Jammu University. Such a communication enables flexible learning by the students.**
- **On the research front, most of the faculty and students are able to utilize ICT facilities in accessing the literature and submitting the research papers online to respective journals. Even organization of conferences and workshops has become a lot easier due to the availability of such a facility.**
- **Interaction among the researchers' community is becoming more and more efficient within the universities and research institutions at the global level.**
- **Though the online facility is available through the websites of respective universities and students try to access information, but in case of any query posed by them, they remain disappointed in general at the institutional level. NIT Hamirpur and J.P. University have been found better in this direction.**
- **Further, most of the universities have shown good results in spreading ICT awareness a long with specialized training in this field, through organizing extension programs on regular basis. In this category, NIT Hamirpur is found to be at the top followed by J. P. University, Jammu University, H. P. University and the two agro- horticulture universities.**

The better performance in ICT field always results in sound impact (Tier IV) at the national and international level in terms of outstanding research publications in the fields of relevance and actual placements. ICT plays a significant role in driving the universities towards excellence by virtue of performance. It also facilitates doing experiments in virtual laboratories and establishes close collaboration between research groups from national to global level. In this respect also, once again, NIT Hamirpur is found to have an edge over others, followed by J.P.University, H.P. University and Jammu University.

CONCLUSIONS

Important conclusions may be described as below:

- **In view of the difficult terrain of western Himalayan region and the struggle of the people, the present study has become more relevant and significant so as to appreciate**

- **the ICT penetration in different universities of the region.**
- **Integration of ICT with various academic programs to develop the problem-solving skill, has helped significantly in enhancing the quality research and better placements. This aspect is being implemented in most of the universities effectively.**
- **The positive coefficients of correlation (CC) of the performance group S with all the other eighteen groups and its analysis provided confidence in the conceptualization of groups presented in the questionnaire.**
- **On the basis of overall ICT status, activities and performance, the present analysis is found to match**
- **with the reported ranking submitted by NAAC and other agencies. It may be recalled that quality has remained the most important defining element with the NAAC.**
- **The universities, to a greater extent, have been found to act as nuclei towards creating skilled professionals with enhanced core competence**

FUTURE STRATEGIES

The pattern revealed in this paper through various aspects of ICT development, points towards future strategies as follows:

- **Although ICT initiatives in different universities are quite encouraging, their extension must be envisaged in all the universities/higher educational institutions of the country. It must include the advanced training programs to prepare professionally skilled manpower specially in problem solving skills for enhancing the core competence of scientists and making these programs more meaningful.**
- **The universities with highly skilled professionals in the field of ICT should function as nucleus to generate more and more skilled human resource. At the same time, these professionals must plan with dedication & determination to solve the real problems and remove the sufferings of humanity. Only then it will fulfill the objectives of `Transforming the Society' as envisaged in the Kothari Commission report of 1966 and the Technology Vision 2020 document prepared by TIFAC for India.**
- **Different courses in the form of e-content inclusive of video, in Indian universities be made available as freeware similar to those of MIT open courseware, as envisioned by NMEICT. It will have an effective long term sustainable impact on society by way of advanced ICT enabled education and empowerment of people in the western Himalayan region of the country.**

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Appendix A

Questionnaire

	ICT Components	*Levels of Performances*				
S. no.	**ICT Vision**	**Level I (Lowest) (a)**	**Level II (b)**	**Level III (Middle) (c)**	**Level IV (d)**	**Level V (highest) (e)**
TIER I						
Group A –ICT Vision						
1.	**Source of vision**	**Enthusiastic students**	**Level 1+ ICT specialists.**	**Level II + Directors/Deans /HOD**	**Level III+ Registrar**	**Level IV + Vice-Chancellor**
2	**Logical conclusion of the vision.**	**0-20%**	**20%-40%**	**40-60%**	**60-80%**	**80% and above.**
3.	**Success rate of Implementation**	**0-20%**	**20%-40%**	**40-60%**	**60-80%**	**80% and above.**
Group B - ICT Initiatives						
1.	**ICT infrastructure**	**Enthusiastic students**	**Level 1+ ICT specialists.**	**Level II + Directors/Deans /HOD**	**Level III+ Registrar**	**Level IV + Vice-Chancellor**
2.	**ICT Learning/ Awareness.**	**Enthusiastic students**	**Level 1+ ICT specialists.**	**Level II + Directors/Deans /HOD**	**Level III+ Registrar**	**Level IV + Vice-Chancellor**
3.	**Complete ICT automation**	**Enthusiastic students**	**Level 1+ ICT specialists.**	**Level II + Directors/Deans /HOD**	**Level III+ Registrar**	**Level IV + Vice-Chancellor**
4.	**Execution of Initiatives**	**<20%**	**20 -40%**	**40-60%**	**60-80%**	**80% and above**
Group C - ICT Planning						
1.	**The scope of ICT planning**	**Purchase of HW/SW only**	**Level I+ Data entry and printing.**	**Level II+ e-resources & data base archive.**	**Level III+ Teaching/ e-content**	**Level IV + research /automation**
2.	**Participation level**	**Enthusiastic students**	**Level 1+ ICT specialists.**	**Level II + Directors/Deans /HOD**	**Level III+ Registrar**	**Level IV + Vice-Chancellor**
3.	**Funding for ICT development.**	**No Funding**	**Limited to department/Self Financing**	**University level funding**	**State Govt**	**Central Govt**
4.	**Implementation and its monitoring**	**Chairman Department Level**	**Dean Faculty level**	**Level I+II+ ICT specialists**	**University committee**	**Level IV+ Audit, Vice Chancellor**
5.	**Curricula**	**Updated 5 year or more**	**Updated 4 year or more**	**Updated 3 year or more**	**Updated 2 year or more**	**Updated 1 year or more**
6.	**Plan achieved.**	**<20%**	**20 -40%**	**40-60%**	**60-80%**	**>80%**

TIER II

Group D- ICT Infrastructure						
S.No	**ICT Infrastructure**	**Level I (Lowest) (a)**	**Level II (b)**	**Level III (Middle) (c)**	**Level IV (d)**	**Level V (highest) (e)**
1.	**Availability of computers to the students (Ratio)**	**1:10 or more**	**1: 0 to 1:8**	**1:6 to 1:4**	**1:4 to 1:2**	**1:2 to 1:1**
2	**Internet enabled computers to students.**	**1:10 or more**	**1: 0 to 1:8**	**1:6 to 1:4**	**1:4 to 1:2**	**1:2 to 1:1**

3.	Availability of computers to the faculty members.	1:5 or more	1:4	1:3	1:2	1:1
4.	Computers out of order available to students	15% or more	10% or more	6% or more	4% or more	2% or less.
6.	Working computers vs out of order computers	5%	4%	3%	2%	1% or less
7.	AMC Engineer and time frame for troubleshooting	No.	3 days or more	2-3 days or more	1-2 days	Less than 10 hours.
8.	Availability of spare parts	No	10%	=40%	70%	90% or more.
9.	Internet enabled Laptops with faculty.	1:5 or more	1:4	1:3	1:2	1:1
10.	EPBAX facility in all the rooms/ offices	Not available	10% -25 % coverage	25 %-50% coverage	50%-75% coverage	75% -100% coverage.
11.	Availability of IP based telephony.	Not available	10% -25 % coverage	25 %-50% coverage	50%-75% coverage	75% -100% coverage.
12.	Availability of Video Conferencing.	NO	In one faculty only	Common facility	More than one faculty.	With all the faculties.
13	Utilisation	Not Available	10-25 %	25-50%	50-75%	75-100%
	Group E – Local Area Network Facility					
1.	Campus Wide LAN	No	25%-40%	40%-60%	60%-90%	90% or more.
2.	Backbone within campus	No	Cat5/5 e backbone	Cat6 backbone only.	OFC backbone + Cat6.	OFC backbone +Cat7e
3.	Redundancy feature on campus backbone	No	Covers 25%	Covers 50%	Covers 75%	Covers 100%
4.	Type of Network switches (central switch)	No switch	Layer II	Layer II/ Manageable	Layer II+III Manageable	Multi layer Chassis switch
5.	Number of hubs / Layer II (Non Manageable)	More than 40%	30%-40%	20%-30%	10%-20%	No hub available.
6.	Number of Layer II (Manageable)	NO	10%-20%	20%-30%	30%-40%	More than 40%
7.	Number of Layer III (Manageable)	NO	10%-20%	20%-30%	30%-40%	More than 40%
8.	Campus structured cabling done?	Not done	Upto 40%	40-70% done	70-95% done	95% or more
9.	Capacity of end user connection available	No patch cords.	Less then cat5 (10 Mbps)	CAT5e (100 Mbps)	CAT 6(Giga)	CAT 7e
10.	% of 10 Mbps Ethernet available in systems	80% or more	50%-80% done	20%-50%	05%-20%	Less than 5%.
11	% of 100 Mbps Ethernet available in systems	Less than 5%.	05%-20%	20%-50%	50%-80% done	80% or more
12.	% of 1 Gbps Ethernet available in systems	Less than 5%.	05%-20%	20%-50%	50%-80% done	80% or more
13.	% of 10 Gbps Ethernet available in systems	None	Upto 20%	20%-50%	50%-80% done	80% or more
14.	Uptime of LAN	40%	40-60%	60-80%	80-97%	More than 97%

15.	**Availability of network.**	**1 building**	**2-10 buildings**	**11-20 buildings**	**Campus with all the hostels**	**Level IV+ Staff Residence**
16.	**No of Internet users in the campus.**	**100 -200 users**	**201 -400**	**401-600 users**	**601-800 users**	**801 or higher**
Group F – Internet, Network Security.						
1	**User Authentication**	**Not done**	**0%-20%**	**20%-50%**	**50-90%**	**90% or above**
2.	**User -Mac Address Binding available**	**Not done**	**0%-20%**	**20%-50%**	**50-90%**	**90% or above**
3.	**User -IP address Binding done in your campus**	**Not done**	**0%-20%**	**20%-50%**	**50-90%**	**90% or above**
4.	**User-Mac address-IP address binding**	**Not done**	**0%-20%**	**20%-50%**	**50-90%**	**90% or above**
5.	**Internet facility with VSAT**	**Not available**	**512 kbps-1 Mbps**	**1 Mbps (1:1)**	**2 Mbps**	**2 Mbps(1:1) or higher**
6.	**Internet facility through leased line on copper**	**Not available**	**1 Mbps or 1 Mbps (1:1)**	**2 Mbps**	**2 Mbps(1:1)**	**More than 2 Mbps (1:1)**
7.	**Internet facility through leased line on OFC**	**1 Mbps -2 Mbps**	**1-2 Mbps (1:1) ratio**	**4 Mbps**	**4 Mbps (1:1) ratio**	**More than 4 (1:1) ratio**
8.	**No of leased line available.**	**1**	**2**	**3**	**4**	**5**
9.	**Uptime of internet leased line link**	**<40%**	**40-60%**	**60-80%**	**80-97%**	**> 97%**
10.	**Internet performance (Speed)**	**not reliable**	**always Slow**	**Slow only in peak hours**	**Smooth with little delay.**	**Smooth w/o any delay.**

Group G- Mobile Computing Access Facilities

1.	**Is your campus networked with secured Wi-Fi.**	**One building**	**2-10 buildings**	**11-20 buildings (without hostels)**	**20-30 buildgs + hostels**	**IV+ teachers residences**
2.	**Is internet available via mobile computing .**	**not reliable**	**Always Slow**	**Slow only in peak hours**	**Smooth with little delay**	**Smooth without delay**
3.	**Access to digital tools, through Wi-Fi**	**Not available**	**20%**	**20-50%**	**50-80%**	**>80%**
4.	**Wi-Fi Enabled Internet Access 24x7 bases**	**not reliable**	**Always Slow**	**Slow only in peak hours**	**Smooth with little delay.**	**Smooth w/o any delay.**

Group H - System, Application software.

1.	**Operating Systems in use MS windows 98**	**Not available**	**20%**	**20-50%**	**50-80%**	**80% or higher**
2	**Microsoft windows2000**	**Not available**	**20%**	**20-50%**	**50-80%**	**80% or higher**
3	**MS windows 2003**	**Not available**	**20%**	**20-50%**	**50-80%**	**80% or higher**
4	**Microsoft windows 2007 or higher**	**Not available**	**20%**	**20-50%**	**50-80%**	**80% or higher**
5	**Open source**	**Not available**	**20%**	**20-50%**	**50-80%**	**80% or higher**
6.	**Unix**	**Not available**	**20%**	**20-50%**	**50-80%**	**80% or higher**
7.	**Solaris**	**Not available**	**20%**	**20-50%**	**50-80%**	**80% or higher**
8.	**Office Applications**	**Not available**	**20%**	**20-50%**	**50-80%**	**80% or higher**

9	**Groupware software is in use**	**Not available**	**20%**	**20-50%**	**50-80%**	**80% or higher**
10.	**Scientific software like simulations tools in use**	**Not available**	**20%**	**20-50%**	**50-80%**	**80% or higher**
11.	**Overall user Performance/ Satisfaction**	**None**	**25%**	**25-50%**	**51-80%**	**80% or higher**
Group I - Web Site and Information systems.						
1.	**Academic information available on intranet**	**Not available**	**20%**	**20-50%**	**50-80%**	**80% or higher**
2.	**E content/ Lecture notes available via Web Server**	**Not available**	**20%**	**20-50%**	**50-80%**	**80% or higher**
3.	**Online attendance, Marks, examination schedule, etc**	**No Information**	**20% information**	**20-50% information**	**50-80% information**	**80% or higher information**
4.	**Encouragement by teachers for online submission of assignments**	**No**	**20% Faculty**	**20-50% Faculty**	**50-80% Faculty**	**80% or higher Faculty**
5.	**e- communication within departments**	**No**	**20%**	**20-50%**	**50-80%**	**> 80%**
6.	**Online test/Exams of teaching courses conducted**	**No.**	**25%**	**25%-50% Test /Exams**	**50-80% Test /Exams**	**>80%**
7.	**Entrance exam to various courses conducted online**	**No.**	**25%**	**25%-50%**	**50-80%**	**>80%**
8.	**Entrance exam is conducted through OMR/OCR System**	**No. Only manual**	**25%**	**25%-50%**	**50-80%**	**>80%**
9.	**Performance due to online communication**	**None**	**0-25%**	**25-50%**	**50-75%**	**>75**
Group J – Teaching Display Technologies						
1.	**Peripherals available in your campus**	**No**	**Dot Matrix, inkjet Printer**	**Laser printers, scanners**	**III + Network laser printers,**	**IV + printing management**
2.	**LCD display class room teaching**	**No**	**25%**	**25-50%**	**50-75%**	**>75%**
3.	**Storage of teaching material via digital board**	**No**	**25%**	**25-50%**	**50-75%**	**>75%**
4.	**Video Storage of lectures**	**No**	**25%**	**25-50%**	**50-75%**	**>75%**
5.	**Availability of teaching display technology.**	**No**	**25%**	**25-50%**	**50-75%**	**>75%**
Group K- ICT Technical Staff						
1.	**Ratio of technical staff to 30 computer in labs.**	**No Tech. Staff**	**1-2**	**2-4**	**4-6**	**>6**
2.	**Confidence level of solving tech. problems**	**<20%**	**20-40%**	**40-60%**	**60-80%**	**80-100%**
3.	**Are Technical staff motivated?**	**<20%**	**20-40%**	**40-60%**	**60-80%**	**80-100%**

4.	**Job Satisfaction of ICT staff.**	**<20%**	**20-40%**	**40-60%**	**60-80%**	**80-100%**
5.	**Troubleshooting**	**Less than 10%**	**10%-40%**	**40-70%**	**70-80%**	**80%-100%**
Group L - ICT Budget						
1	**During 2006-07 in INR.**	**Upto 5 Million**	**5-10 Million**	**10-20 Million**	**20-30 Million**	**Above 30 Million**
2	**During 2007-08 in INR**	**Upto 5 Million INR**	**5-10 Million**	**10-20 Million**	**20-30 Million**	**Above 30 Million**
3	**During 2008-09 in INR**	**Upto 5 Million INR**	**5-10 Million**	**10-20 Million**	**20-30 Million**	**Above 30 Million**
4	**Utilisation of budget in INR**	**Upto 5 Million INR**	**5-10 Million**	**10-20 Million**	**20-30 Million**	**Above 30 Million**

Group M – E-Library System						
1	**Facility of E-Catalogs available**	**None**	**Upto 25%**	**25%-50%**	**50%-75%**	**> 75%**
2	**E-thesis/dissertation submission available.**	**None**	**Through CD/DVD**	**Online through Campus LAN.**	**through LAN WAN**	**IV + Online Feedback/status.**
3	**Extension Services available.**	**None**	**Upto 25%**	**25%-50%**	**50%-75%**	**> 75%**
4	**Availability of e content via Intranet/Internet**	**No**	**<25%**	**25%-50%**	**50%-75%**	**>75%**
Group N- E-Placement/Alumni Portal						
1.	**Is E-placement with online resume, test, etc.**	**Manual work**	**Done electronically**	**Done online within intranet**	**III+ Internet.**	**IV + linkage with industries online.**
2.	**E- Discussions with industries & students**	**Manual work**	**Done electronically**	**Done online within intranet**	**III+ Internet.**	**IV + linkage with industries online.**
3.	**Online alumni portal.**	**No.**	**Manual work**	**Online Registration**	**With updated database (DB)**	**Dynamic Data Base.**

TIER III

Group O- Integration of ICT in Teaching and Learning.						
1.	**Approach of delivering lecturers using ICT i.e. ppt, etc**	**<20% use ICT**	**20-40%**	**40-60%**	**60-80**	**>80.**
2.	**Approach of delivering lecturers using ICT and video.**	**<20% use ICT**	**20-40%**	**40-60%**	**60-80%**	**>80%**
3.	**To make subject interesting using simulations models, etc.**	**<20% use ICT**	**20-40%**	**40-60%**	**60-80%**	**>80%**
4.	**Online Counseling**	**<20% use ICT**	**20-40%**	**40-60%**	**60-80%**	**>80%**
5.	**Effective use of ICT tools for teaching and learnin**	**<20% use ICT**	**20-40%**	**40-60%**	**60-80%**	**>80%**
Group P- Research using ICT						
1.	**Using Internet and open e-resources**	**<20%**	**20 -40%**	**40-60%**	**60-80%**	**>80%**
2.	**Availability of . subscribed E-journals**	**<100**	**<500**	**<1000**	**<2000**	**Above 2000**
3.	**No. of e-journals (used per person)**	**<5**	**<10**	**<15**	**<20**	**Above 20**
4.	**Full text availability of desired e journals**	**<20%**	**20 -40%**	**40-60%**	**60-80%**	**>80%**

5	**Frequently of usage for e-journals?**	**Once in a month**	**Once in three weeks**	**Once in two weeks**	**Once in one week**	**Every day**
6.	**Reasons for subscribing e-journals if subscribed by the university.**	**Not available**	**Economy**	**Solves theft , mutilation problems.**	**Easy to Archive**	**Easy Distribution over network**
7.	**Satisfaction Level with e-journals with full text.**	**<20%**	**20 -40%**	**40-60%**	**60-80%**	**>80%**
Group Q- ICT training Programs						
1.	**ICT Support for training to lecturers available**	**No such facility**	**Upto 20%**	**20-50%**	**50-80%**	**80% or above.**
2.	**ICT awareness program conducted annually**	**None**	**1**	**2**	**3**	**4 or more**
3.	**Advanced ICT training program conducted annually**	**None**	**1**	**2**	**3**	**4 or more**
4.	**No. of programs Organised**	**None**	**1**	**2**	**3**	**4 or more**

TIER IV

Group R – Accomplishment (Research/ Actual Placement)						
1	**No of research publications per annum per 100 faculty members.**	**<10**	**10-20**	**20-30**	**30-50**	**>50**
2	**Research collaboration using facility of (Email/Online)**	**Nil**	**Once a month**	**Once a fortnight**	**Once a week**	**Every day.**
3	**Institute Industry Interaction (3i) Program for students**	**Nil**	**Once a year**	**Once in 9 month**	**Once in 6 month**	**Once in 3 Month.**
4	**On campus placement annually in percentage**	**Nil**	**Upto 30%**	**30-60%**	**601-90%**	**More than 90%**