Global Technologies and their Adoption in Higher Education in India

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Abstract

The paper aims at identifying the benefits and impediments of use of New Educational Technologies (NET) in higher educational institutions in National Capital Region. The study is based on data from six universities, namely: Ansal University, Gurgaon; Gautam Buddha University, Greater NOIDA; ITM (Northcap) University, Gurgaon; JamiaMilliaIslamia University; Jawaharlal Nehru University; and University of Delhi. The study finds the evidence that the provision of NET in self-finance universities is better than public sector universities. The faculty of all the institutions assigned highest importance to self-motivation as the key factor in adoption of NET by them. They considered 'learning by using' the best way to remain updated with the latest developments in ICT led teaching methodologies.Non-availability of skill upgradation facilities in the institution was cited as the major obstacle in the adoption of NET. The views of students were also collected and analysed. The study finds almost no association between the degree of NET used by students and the job career they want to pursue.Results of the Cluster Analysis suggest that substantially high percentage of students find that NET are useful or very useful for understanding concepts more clearly and managing class activities in a better way.The majority of students also opined that 'E-class rooms are not very effective'and 'E-class technology is not very reliable' as the major impediments in the NET use.

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1. Introduction

Education plays a supreme role in the life of an individual. It is a very socially oriented activity and quality education has traditionally been associated with strong teachers having high degrees of personal contact with learners. In recent times teaching methodology has experienced tremendous change. The New Educational Technologies (NET) is expected to help both the teachers and students. Better quality of education is translated into human capital and skill commensurate with current industrial needs. The growing use of NET is changing and will likely continue to change many of the strategies employed by both teachers and students in the learning process. The use of NET in education lends itself to the content-centred curricula and competency-based curricula. This leads to more student-centred learning settings. But with the world moving rapidly into digital media and information, the role of NET in education is becoming more and more important and this importance will continue to grow and develop in this century. As students and teachers gain access to higher bandwidths, more direct forms of communication and access to sharable resources, the capability to support these quality learning settings will continue to grow (Oliver, 2013).

NET by their very nature are tools that encourage and support independent learning. Students using NET for learning purposes, become immersed in the process of learning and more and more students use computers as information sources and cognitive tools (Jonassen& Reeves, 1996). Learning approaches using NET provide many opportunities for constructive learning through their provision and support for resource-based, student-centred settings and by enabling learning to be related to context and to practice (Berge, 1998).Skills and knowledge are the driving forces of economic growth and social development for any country. The countries with higher and better levels of skills adjust more effectively to the challenges and opportunities. India is progressively moving towards a knowledge economy, due to the abundance of capable, flexible and qualified human capital. Thus, it has become increasingly important that the country should focus on advancement of skills that are relevant to the emerging economic environment. In order to further develop and empower the human capital to ensure global competitiveness, it is a necessity to impart quality education at the tertiary level. Although emphatic stress is laid on

education and training in our country, but still there is a shortage of skilled manpower to address the mounting needs and demands of the economy.

It is worth mentioning that pervasiveness of NET is very large. They can be applied in managerial functions in academic institutions or for knowledge acquisition and dissemination among the students. There has been rapid adoption of NET in Indian educational institutions, i.e., at school as well as tertiary levels. However, it is less known for what purpose these new technologies are being used by these institutions. Irrespective of the purpose of use of NET, a strong and reliable physical and technological infrastructure called knowledge infrastructure is essential for successful use of new technologies. Knowledge infrastructure has two components. First, that is within control of the institution that intends to adopt NET and second, which is beyond the limit of individual institutions. Second part of the knowledge infrastructure encompasses a reliable communication network connecting national and international boundaries. The State is responsible to providing latest communication technologies which is beyond the scope of this paper.

The remainder of the paper is organized as follows: Section 2 contains review of literature while Section 3 describes the objectives and hypotheses of the study. The analysis of opinions given by the faculty and students on various aspects of NET is presented and discussed in Sections 4 and 5. Finally Section 6 presents the summary andconclusions of the study.

2.   Review of Literature

Various studies have been carried out on the role of education towards economic development and human capital. Some of the relevant studies are discussed in this section.According to Oliver and Short (1996) adoption of ICTs into classrooms and learning settings have increased efficiency in terms of flexible program delivery. Another study by Oliver (2000) found that ICTs are able to provide strong support for teaching techniques as it provides world class settings for competency and performance-based curricula that make sound use of the these technologies. Another study by Young (2002) concludes that ICT has helped students' capability to undertake education anywhere, anytime and at any place. This flexibility has heightened the availability of just-in-time learning and provided learning opportunities for many more learners who previously were constrained by other commitments. He also found that teachers appreciate mobile

technologies and seamless communications and are able to be used to advantage for supporting 24x7 teaching and learning.

Deaney et.al (2003) found three major points for using ICT i.e. the need for wider skills for effective use of tools, the need to focus on the power of technology and the need to shift familiar patterns of classroom interaction by these technologies. On the other hand work-based learning is becoming popular with the integration of ICT in higher education. It advocates need-based learning and training, which is convenient and cost effective as it does not require travel (UNESCO, 2002). In order to face issues brought about by diversification, internationalisation and marketisation of higher education, it is necessary to innovatively integrate ICT in higher education (Hattangdi&Ghosh, 2008). Authors argue that this will ensure good quality, accessible and affordable higher education available to people in the developing countries.

Higher education plays a pivotal role in the economic and social growth of a country. Education increases the productive skills of individuals and also their earning power. It enables individuals to absorb new ideas, increase social interaction, gain access to improved health and many more tangible and intangible benefits (Kozma, 2005). Several studies (Glaeser and Maré, 2001; Wheeler, 2001; and Lal, 2005) provide evidence that the urban wage premium increases with education, suggesting that productivity effects are strongest for highly skilled workers. Another study by Morretti (2004) also shows education influences skill intensity. By using data on industry and college education rates, it shows that productivity is increasing in the share of city workforce that is college educated. In one of the studies by Lal and Paul (2013) found that firms that employed highly skilled workers performed better compared to others. Export oriented firms largely survive due to innovation and creativity that are effectively managed by their best workforce. Hence human resources are the most vital factor for firms' innovative activity.

Tertiary education in developing countries is serving as repositories of knowledge and human capital that will contribute to the economic development of the economies (Postiglione, 2009). The importance of human capital has been captured by several other studies such as (Lal, 2005; Siddharthan and Lal, 2004; Ducatel, 1998; and others). Lal's study finds that skilled human capital is needed not only in high-technology sector such as electronics but also in low-technology sectors such as garments manufacturing. The present era of globalization is marked

with adoption of ICT led technologies in every sphere of life. Hence it is considered important to analyze the institutions responsible for creating innovative human capital in India.

3.   Objective and Hypotheses

The earlier studies have analyzed several aspects associated with higher education, such as wage premium of workers with technical knowledge, contributions of skill intensity in productivity and export performance, and economic development in general. This study on the other hand focuses on the capability of higher education institutions in creation of commensurable skill among youths. In Indian context these institutions can be grouped into three categories, namely: government institutions (state or central); government aided institutions; and self-finance ones. The self-finance institutions have been encouraged by the government more extensively for the last two decades. Consequently, a large number of institutions have come up in the country.

It is expected that self-finance institutions are better equipped with most advanced teaching technologies due to easy decision making process and severe competitive pressure. Hence it is aimed to examine the provisions of NET among various forms of institutions. Having no *a-priory* knowledge of any study investigating the impacts of NET on students, the paper examines various kinds of impacts on them. The identification of impediments in the adoption of NET is also a priority of the study. The main objectives of the study are to examine-
i.   The provisions of NET among various types of institutions
ii.   The role of institutions in promoting the use of NET
iii.   The association between job preference and the intensity of NET use
iv.   The impacts of use of NET on students
v.   Impediments of the use of digital technologies in the class

Several universities have come up in and around Delhi in the last several years. Although they are permitted to run various courses after meeting the standards set by the government, the self-finance institutions try to equip themselves with much advanced digital technologies as possible. This is because there is an intense competition to attract students. Another factor that distinguishes various types of institutions is the decision making process. It is much simpler in self-finance and very archaic in government or aided institutions. The decision making process is

also likely to influence the availability of digital technologies. As far as the role of institutions in promoting the use of NET is concerned, the government and aided institutions have very little incentive to do so while the self-finance institutions need to attract good students so that their reputation in maintained. On the other hand the first preference of students is the public funded institutions due to low fee and better academic infrastructure. In view of the objectives of the study the following hypotheses are formulated:

i. The availability of digital infrastructure varies significantly among various types of institutions
ii. The self-finance institutions are likely to promote NET more rigorously
iii. Use of NET is expected to have significant impact on students in their various activities
iv. Students whose preference is to go in for technical jobs are expected to be extensive users of NET
v. Reliability and effectiveness of e-class technologies are likely to be major impediments in their adoption

In order to test the hypotheses, data from all the stakeholders, i.e., management, teachers, and students were collected through semi-structured questionnaires. The sample consists of 35 faculty members and 164 students from six universities.

4. Faculty and NET

The sample universities in the study have been categorised according to their source of funding. The government funded institutions that are in existence since long time are termed public namely – University of Delhi, Jawaharlal Nehru University and JamiaMilliaIslamia University. The public funded university came into existence after year 2000 are categorised as public-new,i.e.Gautam Buddha University. The need to categorise public and public-new is due to the fact that the infrastructure and human resources are very different in both these institutions. The public-new institution is equipped with state-of-the-art technology and faculty is young and motivated while in public universities it is not the case. The remaining universities namely Ansal University and ITM University are categorised as private. Across all the institutions, 35 teachers in total were interviewed. The analysis of their opinionson various aspects of NET is presented in this section. The Table 1 depicts the gender distribution of teachers.

Table 1: Gender distribution of teachers

University Type → Gender	Public	Public-New	Private	Total
Male	11 (68.8)	4 (50.0)	--	15 (42.9)
Female	5 (31.2)	4 (50.0)	11 (100.0)	20 (57.1)
Total	16 [45.7]	8 [22.9]	11 [31.4]	35 [100.0]

Note: Chi-square=12.797; Sig.=0.002: Figures in parentheses are column %; square brackets are row %

It can be seen from the table that male teachers are in large percentage in public institutions (68.8% males) while the females prefer private institutions (100%). It may be due to various reasons. One of them could be the mobility of female teachers is controlled by their social settings as they prefer an employment near the location of stay. On the other hand, male teachers switch jobs quite frequently for monetary gains. Another reason for preference of females is their dedication towards work.

The distribution of teachers according to their age is depicted in Table 2.

Table 2: Distribution of teachers by Age

University Type → Age	Public	Public-New	Private	Total
< 30 years	4 (25.0)	--	3 (27.3)	7 (20.0)
30- 44	3 (18.7)	8 (100.0)	6 (54.5)	17 (48.6)
45 +	9 (56.3)	--	2 (18.2)	11 (31.4)
Total	16 [45.7]	8 [22.9]	11 [31.4]	35 [100.0]

Note: Chi-square=15.723; Sig.=0.003:Figures in parentheses are column %; square brackets are row %

It can be seen from the table that the sample of teachers in public universities in the highest age bracket i.e. 45+ years is 56.3%. The age-wise distribution of teachers is quite obvious. The new institutions whether private or public, are expected to employ young faculty while in the old institutions, the average age of faculty is supposed to be higher. This is substantiated by the fact that 81.8% of the teachers in private universities and 100% teachers in public-new institutions are below the age of 45 years. Hence the association is statistically significant at the level of 1%.

The stream-wise distribution of the sample population is presented in Table 3.

Table 3: Distribution of teachers by Stream

University Type → Stream	Public	Public-New	Private	Total
Science	7 (46.7)	--	1 (9.1)	8 (23.5)
Engineering	--	6 (75.0)	2 (18.2)	8 (23.5)
Social Science	8 (53.3)	--	2 (18.2)	10 (29.5)
Management	--	2 (25.0)	6 (54.5)	8 (23.5)
Total	14 [44.1]	8 [23.5]	11 [32.4]	34 [100.0]

Note: Chi-square=32.717; Sig.=0.000:Figures in parentheses are column %; square brackets are row %

Efforts were made to draw a representative sample from teachers of all the streams across universities. The distribution presented in the table shows that the teachers are from traditional courses. This is because the public universities focussed on traditional courses and hence the sample of teachers was drawn from sciences and social sciences faculty. The focus of public-new university is on modern courses i.e. engineering and management. Hence the sample is limited to engineering and management courses. On the other hand, private universities have to take care of both traditional and new courses. Hence a representative sample is drawn among all the streams.

The Table 4 depicts whether the university campus is Wi-fi enabled. It is worth mentioning here that most of the departments within the public funded University had departmental Wi-fienability rather than university as a whole.

Table 4: Wi-fi enabled Campus

University Type → Responses	Public	Public-New	Private	Total
Yes	4 (25.0)	8 (100.0)	11 (100.0)	23 (65.7)
No	12 (75.0)	--	--	12 (34.3)
Total	16 [45.7]	8 [22.9]	11 [31.4]	35 [100.0]

Note: Chi-square=21.685; Sig.=0.000:Figures in parentheses are column %;
square brackets are row %

Although majority of the teachers (75%) opined in negative with regard to availability of Wi-fi in public universities, it was found during the survey that several individual departments had access to these technologies. Another reason for non-availability of Wi-fi in the entire campus is due to the sprawling structure of the public campuses. On the other hand, the campuses of the recently established institutions are very compact and new networking technologies can be provided with comparatively less financial resources.

The response on the various modes of teaching adopted by the teachers is indicated in Table 5. This is a multi-response question as more than one modes of teaching could be adopted by the teachers.

Table 5: Mode of teaching

University Type → Responses	Public	Public-New	Private	Total
Institutional server	--	3 (37.5)	9 (81.8)	12 [34.3]
Internet	4 (25.0)	5 (62.5)	9 (81.8)	18 [51.4]
Standalone	4 (25.0)	5 (62.5)	1 (9.1)	10 [28.6]
Offline	14 (87.5)	4 (50.0)	4 (36.4)	22 [62.9]

Note: Figures in parentheses are percentage of total respondents in each category of institution;
square brackets are percentage of total respondents

In private institutions the most preferred mode of teaching is institutional server and internet (81.8% each). The standalone and offline modes are not preferred for teaching. In case of public-new institutions, the most preferred modes are internet and standalone (62.5% each). The public

institutions on the other hand prefer offline mode (87.5%) followed by standalone and Internet (25.0% each). It can be inferred from the results that newer teaching technologies are preferred in new institutions.

The result of another multi-response question regarding classroom equipment is depicted in Table 6.

Table 6: Classrooms equipped with

University Type → Equipment	Public	Public-New	Private	Total
Standalone	4 (25.0)	2 (25.0)	1 (9.1)	7 [20.0]
With internet access	7 (43.8)	6 (75.0)	8 (72.7)	21 [60.0]
With intranet access	3 (18.8)	3 (37.5)	6 (54.5)	12 [34.3]
Whiteboard	9 (56.3)	8 (100.0)	10 (90.9)	27 [62.9]

Note: Figures in parentheses are percentage of total respondents in each category of institution;
square brackets are percentage of total respondents

The table indicates that in privately owned institutions, majority of teachers opined that classrooms are equipped with white boards (90.9%) followed by computers with internet access (72.7%).In case of public-new institutions, all the teachers indicated that the classrooms are equipped with whiteboards while 75.0% informed that internet accessibility is also available in the classrooms. Similar trend is visible in public universities,with 56.3% of the teachers opinion in favour of whiteboard followed by 43.8% indicated the availability of internet access. Thus it can be inferred that across all the institutions it is reported that classrooms are equipped with traditional (whiteboard) and modern technology (internet access).

The opinion on the motivational factors for using NET in teaching was sought. The opinions were collected on a five point Likert scale i.e. 1 'least imp' 2 'less imp' 3 'to some extent' 4 'important' 5 'most important'. The average of the opinions thus collected were computed and presented in Table 7.

Table 7: Motivational factors

University Type → Factors	Public	Public-New	Private
Self-motivation	4.00	4.71	3.78
Management made compulsory	2.18	2.60	1.80
Expectations of students	3.75	3.86	3.50
Ease of explaining the concepts	3.33	4.43	3.67
Followed other teachers	3.00	2.25	2.00
Encouragement from management	1.88	2.60	3.75
Ease of managing lecture notes	3.36	3.60	3.38

Note: Figures are average scores

It can be seen that 'self-motivation' got a score of 4.00, 4.71 and 3.78 in all the three categories of universities suggesting that self-motivation is considered an important motivating factor in the adoption of NET for teaching. The second motivating factor in public universities is 'expectations of students' while in public-new universities 'ease of explaining the concepts' has emerged important. On the other hand in private universities, the second motivational factor is the 'encouragement from management'. The third motivational factor that has emerged is 'ease of managing lecture notes', 'expectations of students' and 'ease of explaining the concepts' in public, public-new and private institutions respectively. It is clear from the results that self-motivation is the main factor for adoption of new technologies irrespective of the nature of the institution. In private universities it's the management's motivation that plays an important role while in public institutions it is the expectations of students. The results are on the expected lines.

It was thought of necessary to evaluate the functional use of new technologies by the faculty. In this context, teachers were requested to give their opinion on frequency of use of digital technologies for preparing the lectures. The opinions were sought on a five point Likert scale i.e. 1 'rarely' 2 'several times a month' 3 'once a week' 4 'twice a week' 5 'Everyday'. The average opinions are presented in Table 8.

Table 8: Digital technology tools used and their purposes

University Type → Activities	Public	Public-New	Private
Browse/search internet	4.13	4.38	4.45
Prepare digital lectures on standalone system	2.36	4.13	2.82
Prepare digital exercises and tasks for students	2.23	3.75	3.00
Communicate online with parents and students	1.64	3.00	2.20
Communicate online with management	1.73	3.88	2.90
Look for online professional development opportunities	2.86	3.50	2.82

Note: Figures are average scores

The table shows that the average scores (more than 4) given by the faculty of all the institutions for 'browse/search internet' is highest among all other tools. It may be inferred that faculty of all the institutions browse internet almost on a daily basis. The teachers of public-new institution assigned similar rank (4.13) to 'prepare digital lectures on standalone system'. The other tools which were being used twice a week (average rank around 4) are 'communicate online with management', 'prepare digital exercises and tasks for students' and 'look for online professional development opportunities' while faculty of private institution use these tools once a week (average rank around 3). The teachers of public institutions 'look for online professional development opportunities' once a week (average score 2.86). It may be inferred from the analysis that the faculty of public-new and private institutions use digital technologies except internet browsing more frequently than that of public institutions.

The information on acquisition and upgradation of knowledge about new teaching technologies was sought. The teachers' opinion were sought on a five point Likert scale i.e. 1 'least imp' 2 'less imp' 3 'to some extent' 4 'important' 5 'most important'. The average scores are presented in Table 9.

Table 9: Upgradation and acquisition of ICT skills

University Type → Choices	Public	Public-New	Private
Learning by doing	3.75	4.50	4.50
Training organized by the Institution	2.92	2.86	3.40
Undertaken professional course	2.58	3.14	3.50
Undertaken subject specific training	3.31	3.43	3.40

Note: Figures are average scores

It can be seen from the table that the teachers' of all the institutions chose 'learning by doing' as most preferred (average score around 4) way of upgrading their ability to use digital technologies. The opinion of all the teachers is similar irrespective of the nature of institution on the other modes of skill upgradation.

It was considered important to take opinion of the teachers on the promotion NET use by the management. There could be several ways such as faculty development initiatives, financial and job promotion incentives. In this context the faculty was requested to rank their choices on a five point Likert scale i.e. 1 'least imp' 2 'less imp' 3 'to some extent' 4 'important' 5 'most important'. The Table 10 presents the average scores.

Table 10: Promotion of ICT use by management

University Type → Choices	Public	Public-New	Private
Faculty development initiatives	2.71	4.25	4.75
Financial incentives	2.71	2.75	3.50
Job promotion incentives	2.14	2.50	4.25

Note: Figures are average scores

It seems that management has a very little role to play in promotion of usage of digital technologies in public funded universities. This is to some extent very obvious as management in

such institutions do not have much say in financial and job promotion opportunities of faculty. The opinion expressed by the faculty of public funded institutions, substantiate this point as the average opinion is around 3. The faculty of private and public-new institution opined that 'faculty development initiatives' by the management is most important and actively undertaken by them. Another distinguishing characteristic among public and private institutions is that job promotion incentives are being considered equally important as faculty development initiatives in private institutions with average score 4.25. This is also on the expected lines as the management in the private institutions does not have to follow a rigid promotion policy.

The rate of obsolescence of digital technologies is very high and hence they need to be upgraded very frequently in order to remain upgraded in the field. This might be difficult for public funded institution to have regular grant for such activities. In this context opinion on the sustainability of these initiatives by the institution were sought. Out of the total 35 respondents, 23 responded in affirmative while two responded in negative. The remaining 10 did not respond.

The literature on NET diffusion in higher education in developing countries suggest that there could be many obstacles such as irrelevance of such technologies, lack of familiarity, lack of initiatives and lack of appreciation by management and students etc. Hence it was considered important to identify the obstacles in diffusion of NET in Indian context. The opinions of teachers on various obstacles were sought on a five point Likert scale i.e. 1 'least imp' 2 'less imp' 3 'to some extent' 4 'important' 5 'most important'. The average score is presented in Table 11.

The obstacles included in the table are not institution-specific. Therefore the analysis is performed subject-wise. Although looking at the rankings (all are 3 or less than 3) given by the faculty from across streams, none of the above are considered an obstacle in NET use. Among the teachers of Science stream, the options namely 'increasing age and reluctance to learn new technologies', 'lack of incentives', 'lack of orientation towards new technologies' and 'non-availability of skill upgradation facilities in the institution' were considered less important while all the other obstacles were ranked as least important.

Table 11: Obstacles in using ICT

Subjects→ Obstacles	Science	Engineering	Social Science	Management
Irrelevance of new technologies in my subject	1.13	1.33	2.14	1.86
Inadequate familiarity of ICT tools	1.88	1.88	2.38	1.71
Lack of orientation towards new technologies	2.00	2.25	2.00	1.86
Increasing age and reluctance to learn new technologies	2.13	2.13	1.86	1.50
Non availability of skill upgradation facilities in the institution	2.00	2.38	3.00	2.00
Lack of incentive	2.13	1.71	2.78	1.71
Lack of appreciation of students	1.63	2.25	2.33	2.17

Note: Figures are average scores

The respondents of Engineering stream consider 'non-availability of skill upgradation facilities in the institution', 'lack of orientation towards new technologies', 'lack of appreciation of students' and 'increasing age and reluctance to learn new technologies'were considered less important while all the other obstacles were ranked as least important. The teachers of Social sciences indicated 'non-availability of skill upgradation facilities in the institution' and 'lack of incentives' as obstacle to some extent while the other options are not considered an obstacle. In the case of Management teachers, all the options were ranked as less or least important thereby suggesting that these are not at all obstacles in use of digital technologies.

The opinion on institutional obstacles in using digital technologies was sought from the respondents. Their opinions were sought again on a five point Likert scale i.e. 1 'least imp' 2 'less imp' 3 'to some extent' 4 'important' 5 'most important'. The data analysis is depicted in Table 12.

Table 12: Institutional obstacles in using ICT

| University Type → Obstacles	Public	Public-New	Private
Inappropriate ICT infrastructure in the institution	2.53	2.29	2.30
Unreliable ICT infrastructure	2.13	2.14	2.20

Note: Figures are average scores

It was found that both the institutional obstacles were ranked less than 3 by the faculty of all the universities, thereby suggesting that these are considered an obstacle to some extent only. Among the options, 'inappropriate ICT infrastructure in the institution' is considered an obstacle to some extent by public institutions whereas the teachers of public-new and private institutions consider both the options as less important.

5.   Students and NET

Before proceeding towards analysis of the opinions collected from the students, it is considered important to present their profile. Out of the total 164 students, the sample consists of 37.8 and 62.2 percentage of male and female respectively. As far as their age distribution is concerned, 25 percent were below the age of 20 while 29.3 percent were above the age of 24 years. The highest percentage (45.7 %) belongs to the students whose age was between 21 and 23 years. The distribution of students by the course they were pursuing is presented in Fig. 1.

Fig. 1: Distribution of students by the course
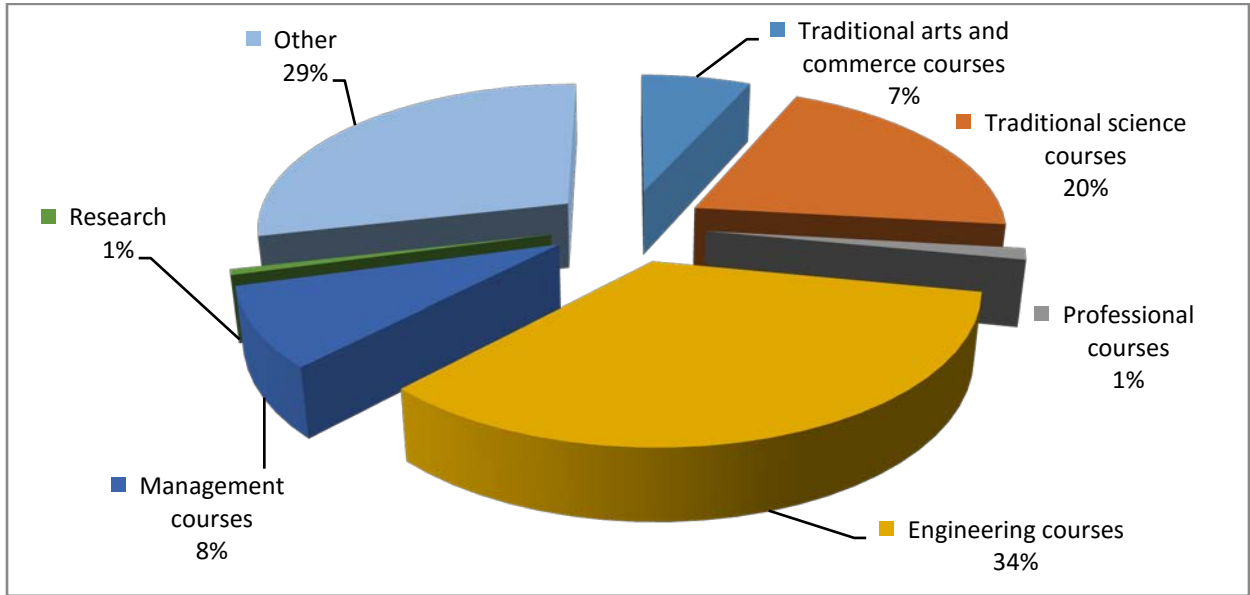
It can be seen from the Fig. 1 that highest percentage is of engineering students. This is because all the sample students from Ansal and Northcap universities were pursuing engineering courses and also many of the students from JNU were pursuing courses in Computer Science. The other category of students is mainly from hospitality and hotel management.

It was expected that job preference of students would influence the use of more extensive digital technologies. This is because the technical knowledge is likely to help them in searching and getting the job more easily than others. In fact enterprises that do campus selection, focus more on technical knowledge of students. In order to capture the association between job preference and use of digital technology, the preference of job was sought from the students. The association between the degree of NET use and the first job preference of students is presented in Table 13.

Table 13: Job preference and use of NET

First Job Preference	Extent of NET use			Chi-Square	Total respondents
	Limited	Moderate	Extensive		
Computer related work	33.3	42.9	23.8	0.305	63
Accountancy	36.8	36.8	26.3	0.667	19
Computer related training	30.8	43.6	25.6	0.332	39
Tour and travel	48.5	30.3	21.2	6.099*	33
Mobile related work	45.0	35.0	20.0	2.335	20
Hospitality	70.0	5.0	25.0	17.608**	20
Mobile related training	33.3	33.3	33.3	0.977	15
Auto and auto-component	44.4	22.2	33.3	2.223	9
Medical profession	30.0	50.0	20.0	0.146	10
Agro-based industry	50.0	20.0	30.0	3.375	10
Journalism	12.5	37.5	50.0	3.134	8
Food processing	53.8	23.1	23.1	4.135	13
Teaching	21.4	35.7	42.9	2.686	14
Total	33.3	42.8	23.9		159

Note: Figures in the table are % of students while in last column it is number of students;
*→sig. 5 % level; **→ sig. at 1 % level*

It can be seen from the table that there is no statistically significant association between job preference, except few, and the use of digital technologies. The preference of 'tour and travel' and 'hospitality' services is negatively associated with intensity of NET use. The higher percentage students whose first preference is either of the two jobs are limited users of NET. For instance 48.5 percent of students whose first preference is tour and travel related job were limited users of NET while merely 21.2 percent were extensive users. Similarly, 70 per cent of students whose first preference is hospitality sector jobs were limited users and twenty-five per cent were extensive users of digital technologies. The negative association between these two job preferences and the intensity of NET use could be due to fact that both these jobs do not require in-depth knowledge of digital technologies. Hence more students have preferred to use NET to a limited extent. This is in contrary to our expectation. The findings suggest that the kind of technical knowledge they acquire during the study of course does not help them in getting the job.

The opinion of students on the purpose of NET use was sought on a binary scale (Yes or No). The purposes considered in the study are- Preparation of assignment, Access to library resources,

Download reading material, Download class notes, Communication with teachers, Communication with other students/friends, Communication with your college/university, and to see results online.

The cluster analysis was used to group the students with similar opinion. Cluster analysis was preferred over discriminant analysis as the latter requires the knowledge of group association of respondents. In the present case, group membership is not known. The cluster analysis forms the clusters of observations in such a way that distance of observation is minimum within a group while it is maximum between the groups. Entire population (all the students) was grouped into three clusters. The results are presented in Fig. 2.

Fig. 2: Purpose of NET use
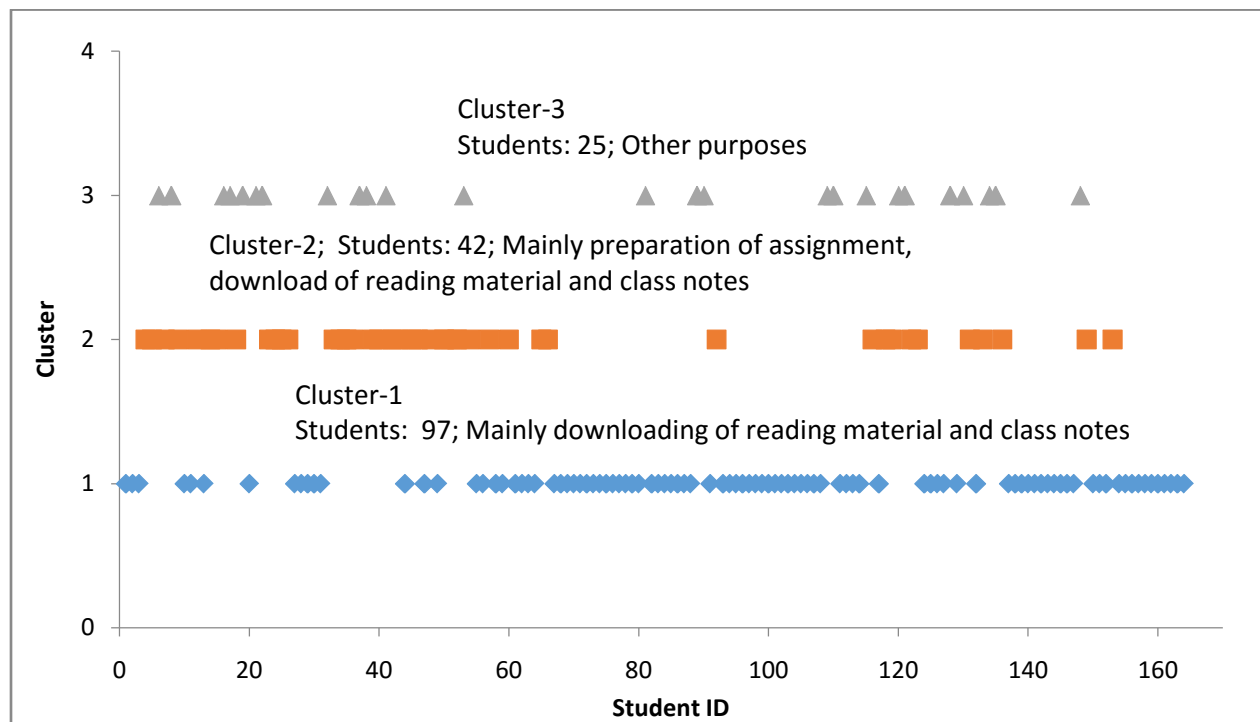
It can be seen from Fig. 2 that 97 (59.15 %) of students have been grouped in cluster 1. The main purposes for their NET use are 'downloading of reading material' and 'class notes'. Among second cluster of 42 students (25.61 %), the main purpose was 'preparation of assignment' in addition to purposes of cluster 1 students. The third cluster of students is those whose purposes of NET use were other than that mentioned by cluster 1 and 2 students. It may be inferred from

the findings of cluster analysis that the main purposes of NET use were downloading of reading material and class notes.

The students are grouped based on the benefit of NET use. The opinions on various benefits were sought on a 4 point scale, i.e., 1 'Not useful', 2 'Neutral', 3 'Useful', 4 'Very useful'. The benefits included in the analysis are- Help in understanding concepts more clearly, Better illustration of ideas, Increased creativity, Better job prospects, Make more confident, Help in personality development, Improved my learning abilities, Provides opportunity to interact with students of other institutions effectively, Equated with international teaching methodologies, Convenience, Help in managing my class activities (e.g. planning, apportioning time etc.). Like purposes of NET, the students are grouped into three clusters using cluster analysis. The results are presented in Fig, 3.

Fig.3: Benefits of NET use
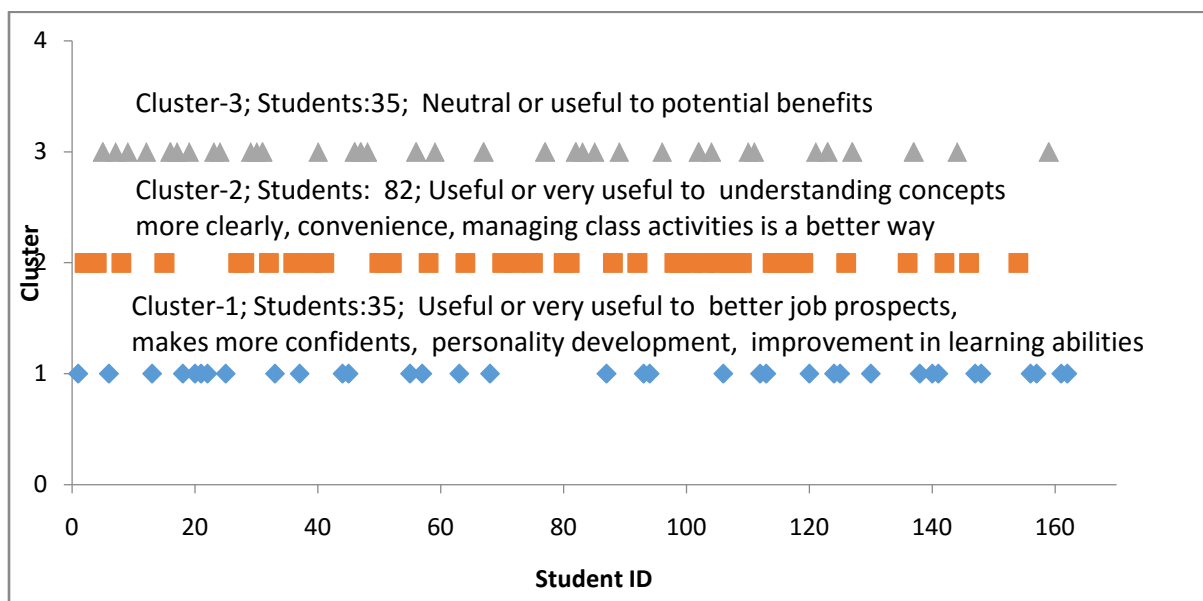
Fig. 3 shows that almost a quarter of students (23.01 %) were classified in cluster 1. They considered NET use is either useful or very useful in making them more confident; personality development, and improvement in learning abilities. On the other hand second cluster of students (53.95 %) assigned same rank to understanding concept more clearly, convenience, and managing class activities in a better way. Similar percentage of students to that of cluster 1 are classified into cluster 3 who were either neutral or considered NET use is useful. They did not

consider that NET use is very useful for them. It may be inferred from the results presented in Fig. 3 that majority of students considered that NET use is useful or very useful in managing class activities and understanding the concepts more clearly. Engineering and science students might dominate this group of students as the clarity in concepts is more relevant for them. For other students the major benefits are managing class activities and improvement in learning abilities.

Improvement in learning abilities has been opined as one of the major benefits of the NET use. It was further analysed to understand how the learning was improved. In this context, the opinion of students on various aspects of learning was sought on a 4 point scale: 1 'Did not use' 2 'Negative effect' 3 'No effect' 4 'Improved learning'. The learning aspects included in the study are- Online syllabus, Online readings, Online discussion board, Online access to sample exams, Submitting assignments online, Getting online assignments back from faculty with comments, Online sharing material among students. Here also the students are classified into three clusters using cluster analysis. The findings are depicted in Fig. 4.

Fig.4: Contributions to improving learning
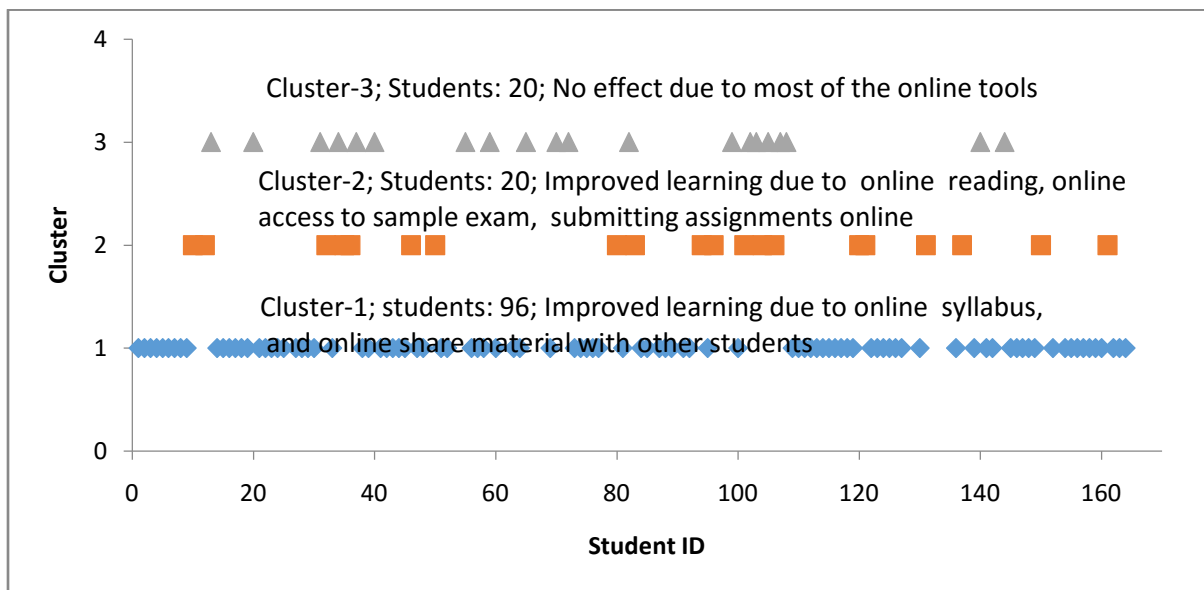
It can be seen from the figure that the 70.59 % of students are grouped in first cluster. This group of students opined that improvement in learning was achieved through the availability of

syllabus online and sharing of online reading material with other students. The second cluster of students (14.71 percent) think that activities such as access to sample exam online and online submission of assignment contributed most in improvement in learning while the similar percentage of students (third cluster) think that there is no impact of online activities on learning process. The findings presented in Fig. 4 suggest that online activities are considered to contribute in learning process.

Opinions on impediments of NET use were also sought from students. The opinion was sought on a 4 point scale: 1 'Major barrier' 2 'To some extent' 3 'Moderate' 4 'Not at all'. The barriers considered in the study are- Not very relevant, Don't have necessary skills, Don't have technical support needed, E-class infra is insufficient, E-classes are not very effective, Technology is not very reliable. The findings of the cluster analysis are presented in Fig. 5.

Fig.5: Impediments to using e-class rooms
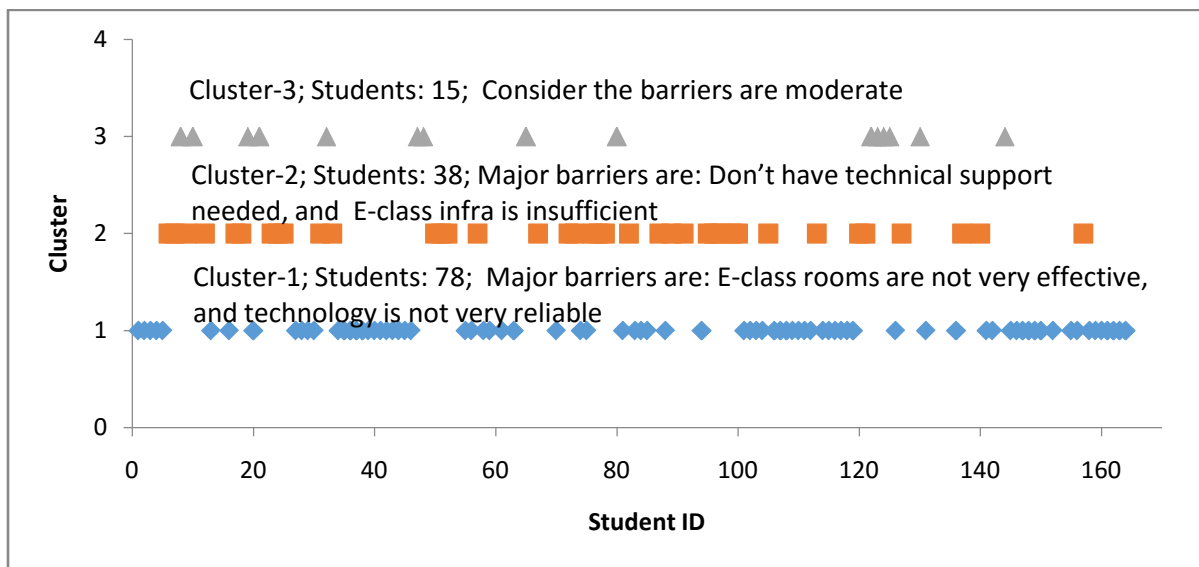
The students are classified into three groups based on their opinion. The largest percent (59.54 %) of students belong to cluster 1 of students who opined that major impediments in adoption of digital technologies in class room are lack of effectiveness of these technologies and also their reliability. The reliability and effectiveness are related to communication network within the institution as well as beyond its boundaries. Even the self-finance institutions may not be willing to go for reliable technologies due to their cost effectiveness. Hence the available technologies for class room teaching are not appreciated by majority of students. The second cluster of

students (29.01 %) opined that the major impediments in adoption of e-class technologies are technical support and lack of infrastructure. These aspects are again related to cost associated with these technologies. The group of students (11.45 %) was of the view that the barrier is moderate. It may be inferred from the findings presented in Fig. 3 that cost associated with use of digital technologies in the class room are major barriers in the adoption of such technologies.

6. Summary and Conclusions

The study is based on primary data collected from six universities, namely: Ansal University, Gurgaon; Gautam Buddha University, Greater NOIDA; ITM (Northcap) University, Gurgaon;JamiaMilliaIslamia University; Jawaharlal Nehru University; and University of Delhi. The sample consists of 35 faculty members and 164 students. The study identifies the varying degree of adoption of New Educational Technologies (NET). The study also examines the impact of NET on the students' learning process. Another objective is to investigate the motivational factors in the adoption of NET in various types of institutions.

The study finds the evidence that the provision of NET in self-finance universities is better than public sector universities. This may be attributed to the decision making process of the institutions. Another reason could the large size of campuses of the public sector institutions. For instance, non-availability of Wi-fi in the entire campus is due to the sprawling structure of the public campuses. On the other hand, the campuses of the recently established institutions are very compact and new networking technologies can be provided with much less financial resources.

The faculty of all the institutions assigned highest importance to self-motivation as the key factor in adoption of NET by them. They considered 'learning by using' the best way to remain updated with the latest developments in ICT led teaching methodologies.Non-availability of skill upgradation facilities in the institution was cited as the major obstacle in the adoption of NET.

The views of students were also collected and analysed. The study finds almost no association between the degree of NET used by students and the job career they want to pursue. Results of the Cluster Analysis suggest that substantially high percentage of students find that NET are useful or very useful in understanding concepts more clearly and managing class activities in a better way. Online activities such as online syllabus, online exam, and online sharing of class

notes with other students are very helpful in learning process. The majority of students also opined that 'E-class rooms are not very effective'and 'E-class technology is not very reliable' are the major impediments in the NET use. These factors could be attributedto the associated cost and economic viability of such technologies.

References

Azeiteiro, Ulisses Miranda Paula Bacelar-Nicolau, Fernando J.P. , Caetano, Sandra Caeiro et.al. (2015). Education for sustainable development through e-learning in higher education: Experiences from Portugal. *Journal of Cleaner Production,* Volume 106, 308-319.

Berge, Z. (1998). Guiding principles in Web-based instructional design.*Education Media International,* 35(2), 72-76.

Deaney, R., Ruthven, K. & Hennessy, S. (2003). Pupil perspectives on the contribution of information and communication technology to teaching and learning in the secondary school.*Research Papers in Education, 18(2)*, 141-165.

Ducatel, K. (1998). *Learning and skills in the Knowledge Economy*, DRUID Working Paper No. 98-2, Danish Research Unit for Industrial Dynamics (DRUID), Aalborg University.

Glaeser, Edward L. and David C. Maré (2001).Cities and Skills.*Journal of Labor Economics,* 19(2), 316-342.

Hattangdi, Ashish and Ghosh, Atanu (2008).*Enhancing the quality and accessibilityof higher education through the use of Information and Communication Technologies*. http://www.iitk.ac.in/infocell/announce/convention/papers/Strategy%20Learning-01-Ashish%20Hattangdi,%20%20Atanu%20Ghosh.pdf (Retrieved on August 24, 2015).

Jonassen, D. and Reeves, T. (1996). Learning with technology: Using computers as cognitive tools. In D. Jonassen (Ed.):*Handbook of Research Educational on Educational Communications and Technology* (pp 693-719). New York: Macmillan.

Kozma, R. (2005).National policies that connect ICT-based education reform to economic and social development.*Human Technology*, 1(2), 117-156.

Lal, K. (2005). E-business, Entrepreneurship, Organizational Restructuring: Evidence from Indian Firms, In: AshwaniSaith and M. Vijayabhaskar (Eds.), *ICTs andIndian Economic Development: Economy, Work, Regulation*, New Delhi, London: Sage Publications, 366-85.

Lal, K and Shakya, S. P. (2011).Impact of Information and Communication Technologies on Rural Higher Education in India, In: Prabhath, S.V. and Sita Devi, P. Ch. (Eds.), *Technology and Rural India*, New Delhi: Global Research Publications.

Lal, Kaushalesh and Paul, Shampa (2013). Export orientation and corporate policy during global economic slowdown. In: Servitization, IT-ization and Innovation Models: Two-stage Industrial Cluster Theory**,** Edited by Hitoshi Hirakawa, KaushaleshLal, Naoko Shinkai and Norio Tokumaru (London and New York: Routledge).

Limbu, Lekha and Markauskaite, Lina (2015). How do learners experience joint writing: University students' conceptions of online collaborative writing tasks and environments.*Computers& Education,* Vol. 82, 393-408

Moretti, Enrico (2004). Workers' Education, Spillovers, and Productivity: Evidence from Plant-Level Production Functions. *The American Economic Review,* 94(3), 656-690.

Oliver, R. and Short, G. (1996). The Western Australian Telecentres Network: A model for enhancing access to education and training in rural areas. *International Journal of Educational Telecommunications*, 2(4), 311-328.

Oliver, R. (2000). Creating Meaningful Contexts for Learning in Web-based Settings.*Proceedings of Open Learning 2000.*(pp 53-62). Brisbane: Learning Network, Queensland.

Oliver, Ron (2013). The role of ICT in higher education for the 21st century: ICT as a change agent for education. http://bhs-ict.pbworks.com/f/role%20of%20ict.pdf (Retrieved on August 24, 2015)

Postiglione, G. (2009). Education impact study: The global recession and the capacity of colleges and universities to serve vulnerable populations in Asia. http://www.adbi.org/workingpaper/2010/03/29/3644.education.impact.study (Retrieved on June 23, 2014)

Siddharthan, N. S. and Lal, K. (2004). Liberalization and Growth of Firms in India, In: C. H. H. Rao, B. B. Bhattacharya and N.S. Siddharthan (Eds.), *Indian Economy and Society: in the era of globalization and liberalization*, New Delhi: Academic Publications, 265-278.

Slechtova, Pavla (2015). Attitudes of undergraduate studentsto the use of ICT in education. *Procedia - Social and Behavioral Sciences*, Vol. 171, 1128 – 1134.

UNESCO (2002).*Open and distance learning trends, policy and strategy considerations*. Paris: UNESCO. http://unesdoc.unesco.org/images/0012/001284/128463e.pdf (Retrieved on August 27, 2015)

Utulu, S C A (2008).Information Technology and Web use Characteristics of Nigerian Private Universities. *African Journal of Library, Archives and Information Science,*18 (2), 119-130

Wheeler, Christopher (2001). Search, Sorting, and Urban Agglomeration.*Journal of Labor Economics*, 19(4), 879-99.

Young, J. (2002). The 24-hour professor. *The Chronicle of Higher Education, 48*(38), 31-33.