Education through Information and Communication Technology: Student Perspective on the Blended Learning

Ruchi Tyagi and Ginni Chawla

***Abstract*—A large number of universities have invested in a Virtual Learning Environment (VLE) which provides opportunities to deliver what is often called 'blended learning'. This combines a mix of ICT (Information and Communications Technology) with various learning resources and delivery methods. The paper focuses on the various ICT based programs conducted by the author in the capacity of coordinator at the RESOURCE and network center of ICT based programs. The methodology used for the paper is observation and participant's feedback.**

***Index Terms*—Blended learning, education, ICT.**

I. Internet — The Inevitable ICT Tool for Education

The rapid expansion and growth of ICT's have now brought unparalleled opportunities for achieving greater educational access and reach. In today's time to become a competent learner requires knowledge and skills to use the new technologies that make learning more challenging than it was years back. The education sector has been strongly influenced by usage of internet [1]. A community's success in coping up with today's knowledge economy depends on large extent on how it embraces the information and communication technology [2]. Knowledge plays a significant role in empowering people to achieve the sustainable development has been long back recognized in India [3]. To fully utilize the potentials of ICT as a tool in education and to bring down the digital divide Government of India has made a budget allocation of 102 million U.S $ in 2008-2009 for the National Mission on Education through ICT ([4]; 2009 was considered as the year of I.T revolution in India). Internet is communication medium with enormous amount of data and it is viewed as 'Virtual Laboratory' [5]. Internet is a must for the learners of this generation [6]. Access and use the appropriate information from the Internet is crucial for the students of this generation [7]. The purpose of this paper is to present the findings of an exploratory study which examined students' perceptions about the introduction of an ICT-based learning approach. E-learning is the delivery of learning through purely digital technology using the Internet or private networks [8]. ICT based learning include benefits like- improved cost-effectiveness; more effective pedagogy; access to learning at one's convenience; reduction in physical class or space needs; increased opportunities for human interaction and contact; and more participation of introverts [9]. It provides opportunities for authentic and self-directed learning [10]. The term 'blended learning' is used in this study to describe the teaching and presentational approach adopted during the conduct of these programs at the nodal and resource center, and the focus of the literature reviews included in the study is on students' experiences of the ICT approach.

Manuscript received May 13, 2016; revised July 14, 2016.

The authors are with the Department of HR & OB, University of Petroleum & Energy Studies, Dehradun, India (e-mail: csractivist@yahoo.co.uk, gchawla@ddn.upes.ac.in).

II. Methodology

The above literature provides some insight into research gaps such as-1. The student expectation from the ICT based program may be different from the one with which it has been designed. The research problem is that the design of an ICT program should not only include what students need and what they want, including in what proportion or to what extent but also the infrastructure set up of the place where these programs would be run. The expectation of the study was that the findings would contribute to the development of a ICT based learning framework for the ICT based programs. Thus the main research objectives were to: Explore students' expectations and experience (from their feedback) with, the ICT learning approach; b) Explore which aspects in the ICT learning mode students enjoy and which they find useful; c) Discover the role of infrastructure and awareness on information and communication technology in the ICT learning mode.

Qualitative research methods such as interview and focus groups have been applied for this research to understand student expectations that should be given significance in designing technology for making the ICT widely acceptable. Focus groups are an accepted research method for gathering qualitative data from targeted populations. Nominal group technique for conducting focus groups allowed unbiased inputs to be collected efficiently and accurately in a structured format [11]; they enable an informal probing of the issues and observation of participants' responses, interactions and behaviors. Furthermore, individuals tend to be more relaxed and candid in such group situations [12; 13]. To further substantiate the interviews and focus group discussions, case studies have been used to illustrate the benefits of ICT adoption.

The data gathering for this study took place during the following academic years: 2013–2014. 1000 Students (in the field of Education, Management, Hospitality, Engineering, Computer Education and Information Technology) were invited to participate in the focus groups and it was made clear that participation was voluntary. The sizes of the focus groups and program details are listed in Table I, while the tools used are illustrated in table II. Focus group meetings were held at

doi: 10.18178/ijssh.2017.7.4.822

the start and end of each program (a gap of 1-2 months between meetings), with the same students returning for the second focus group meetings. At the initial focus group meetings participants were briefed on the nature of the study, how the focus groups would operate and how their views would be recorded anonymously. Discussions were limited to 25–35 minutes. The researcher herself chaired the focus groups because of her good rapport with the faculty members and students. The focus group discussions were recorded and detailed notes of the discussions were taken by an experienced internal assistant who was unknown to the students and faculty members. Responses were analyzed for content, combined together, sorted and charted to find the themes. As the program of focus group meetings continued, discussions were refined on the basis of results from earlier focus groups to examine issues in more detail [14]-[16].

TABLE I: ICT PROGRAM DETAILS

Virtual Lab (400 Participants) *Sponsoring Agency/Organizer: IIT, Delhi- Virtual Labs Project, MHRD, Govt. of India* *Interaction/training-trainer /mode: One (1) day personal training through presentation and practical in IT lab for the faculty, staff and students by the trainers. The virtual Lab was set up through internet with network center Lab students were using these virtual labs and learning through ICT.*
SPOKEN TUTORIAL PROJECT (600 PARTICIPANTS) Sponsoring Agency/Organizer: IIT, Bombay- Spoken Tutorial Project, MHRD, Govt. of India Interaction/training-trainer /mode: Video and audio recording, posters, pen, note pad as study material were provided to motivate the participants. Skype sessions of 1-2 hours were conducted for learning in the I.T Lab. Participants were learning through ICT and took examination on completion of each module on passing the same they were provided with certificate from IIT-Bombay spoken tutorial project. Programs were conduct on following modules-basic IT skills, Open Foam, Python PHP & My SQL, Linux and Ubuntu, C, Advanced C, Java & Net beans, and Libre office suite.

TABLE II: TOOLS EMPLOYED FOR ICT CONTENT DELIVERY AS PER THEIR FREQUENCY OF USAGE ACROSS THE PROGRAMS (APPROXIMATE)

Tools	Usage (%)	Tools	Usage (%)	Tools	Usage (%)
Weblogs	01	Short Videos	05	Video Lectures	20
Email	03	Recorded lectures	20	Power Point Presentations : Online Simulations	10
Skype	30	Electronic Books	01	Social Media – Facebook, Twitter	01
Language Training & Support Tools	07	Podcasting and i-pods	01	Wikis	01

III. FINDINGS

A number of common themes emerged from the review of literature leading to research gaps which helped in framing structured schedule for focused group discussions and interviews.

Students' expectations and experience (from their feedback)

There is a lot of audio disturbance involved which I find quite difficult to balance audibility at Skype [. . .] I need to have it explained to me step by step and I need plenty of practice. (Participant A1); As a student I come in to the college for lectures [. . .] it is an important time for me [. . .] I can do these on-line workshops at home but they are now including these workshops as part of time-table. (Participant B3); Students wanted reassurance that the main form of instruction would prepare them for the examinations or placement and they expected this to be achieved through direct teaching, along with on-line learning broken down into small, achievable steps. (Participant A3); few students said that their handling of learning material was generally disorganized. They told that they do not store items properly once they take on-line test and earn certificate. I don't need to run around trying to get things from other students or run around teacher as I know everything is available I want online (Participant D1). Majority of students liked the continuous online availability of study resources, there were disapprovals. Some students in each of the focus groups have shown their concern on the full visibility of the learning material in the beginning of the course from the outset, due to which they perceive the module subject as being difficult or easy. The focus group participants were asked about their use of the Internet to obtain further subject information. The general view was that students prefer to print an article and read it in paper format. I find it really hard to read papers on-screen [. . .] I use a marker and highlight important points on a printout. (Participant C1) Some students said they want short video clips. Students in all the focus groups said that the online test should be a quiz. They said the quiz should be provided in more than one attempt. They also said that each module should have practice quiz this will help them in background learning and confidence building.

ICT learning mode students enjoy and found useful: The on-line quizzes can help a lot and can give me instant feedback [. . .] so there should be quizzes after every topic for practice and concentrate on things I did not know very well. (Participant B2) I would have liked to spend more time on test style exam questions, so I would know what to expect in the test which I would be taking to earn the certificate (Participant A5). Throughout the spoken tutorial module, we can only join FOSS but not structured writing tool for students to articulate their understanding of concepts and communicate this with others I would like if like world bank online certificate modules (MOOCs) I can share my ideas and know who else are participating (Participant A3).

A. Role of Infrastructure and Awareness on Information and Communication Technology in the ICT Learning Mode)

In the initial focus group meetings, students acknowledged that ICT skills were essential to improve their employability and recognized that future employers would be looking for the ICT skills and competence. However, students appeared reluctant to talk about their actual ICT competence and skill levels, but they remained concerned that the course work involve time over regular study hours and much distracting computer use. The main anxiety appeared to be that basic IT skill module were seen very easy by B. Tech and M.C.A. students while potentially being difficult module by B.Ed. and Hotel Management students, which would require

considerable 'face to face' instruction. It is frustrating to sit by a computer, but not be able to use it. (Participant A1). We are not children we should assess online workshop as per our feasibility rather fixed in time-table (Participant D7) If I have finished my classroom work I should be allowed to go on to other work or even use the Internet while others catch up. (Participant D3) Everyone has a mobile [. . .] it is easy to divide up the work and assess content [. . .] but workshop and labs allows us to have face-to-face meetings through Skype. (Participant B1).

TABLE III: DETAILS OF FEW ICT PROGRAM CONDUCT UNDER SPOKEN TUTORIAL PROJECT IN 2013

Workshop Date (m/d/y)	(program –focus group)	Workshop	Test Date	Participants
03/13/13	MCA A	C	04/15/13	30
03/14/13	MCA B	C	04/15/13	25
03/15/13	MCA C	C	04/15/13	33
03/18/13	MCA D	C	04/16/13	30
03/19/13	MCA A	C	04/16/13	25
04/01/13	MCA B	JAVA	04/17/13	30
04/02/13	MCA C	JAVA	04/17/13	25
04/03/13	MCA D	JAVA	04/17/13	33
04/08/13	MCA A	PHP & MYSQL	04/23/13	30
04/09/13	MCA B	PHP & MYSQL	04/23/13	25
04/10/13	MCA C	PHP & MYSQL	04/23/13	33
04/11/13	MCA D	PHP & MYSQL	04/24/13	30
09/02/13	MCA A	Basic IT Skills	NA	14
09/04/13	MCA B	Linux and Ubuntu	11/01/13	18
09/05/13	MCA C	Linux and Ubuntu	11/01/13	14
09/06/13	MCA D	Linux and Ubuntu	11/01/13	14
09/11/13	MCA A	C	11/11/13	11
09/12/13	MCA B	C	11/11/13	15
09/16/13	MCA C	Java	10/08/13	20
09/17/13	MCA D	Java and Net Beans	10/08/13	20
09/18/13	MCA A	Java and Net Beans	10/09/13	18
09/19/13	MCA B	Java and Net Beans	10/09/13	20
10/23/13	B.Ed. C	LaTex	NA	32
09/24/13	B.Tech D	C	10/ 12/13	30
09/25/13	B.Tech A	C++	10/ 13/13	30
09/20/13	MCA B	Firefox	10/09/13	15
09/24/13	MCA C	Python	11/12/13	20
09/25/13	MCA D	Python	11/13/13	20
09/26/13	MCA A	Python	11/13/13	20
09/27/13	MCA B	Python	11/15/13	18
09/30/13	MCA C	Python	11/15/13	20

TABLE IV: DETAILS OF ICT PROGRAM REQUESTED UNDER SPOKEN TUTORIAL PROJECT TO BE CONDUCT IN FEB AND MAR 2014 (DATE, DAY, COURSE-SEMESTER-SECTION, MODULE, TIME, SLOT)

5 Feb14, Wed, MCA 2nd A –LINUX at 01:30 pm to 03:30 pm.
6 Feb14, Thu, MCA 4th A –PHP My SQL at 01:30 pm to 03:30 pm.
7 Feb14, Thu, MCA 4th A –PHP My SQL at 01:30 pm to 03:30 pm.
5 Mar 14, Wed, MCA 2nd A –advance C++ at 01:30 pm to 03:30 pm.
5 Mar 14, Thu, MCA 4th A-java business applications at 01:30 pm to 03:30 pm.
5 Mar 14, Fri, MCA 5th B-java business applications at 01:30 pm to 03:30 pm.

IV. DISCUSSIONS

Students' expectations and experience: A significant number of students said they liked a well-structured module, with the access to a comprehensive set of study materials tied closely to formal instructional periods and Skype instructions in between brings clarity on queries. Many of these students said they were motivated to read the study material and view the presentation slides before attending a lecture only when they are instructed by the registering faculty. The problem lies when the teachers themselves are not confident that the students will find learning through the internet medium acceptable, which makes them hesitant to experiment with internet learning [1]. According to Reference [17], 'The faculty have to be trained on how to use the Internet to exploit technologies. Under mentioned are the post program views of a participant of researcher's network center on an ICT based short term training program on 'Communication Skills'.

"*ICT based program are useful and help the student in improving their academic profile" Ms. Shilki Singh (Resource Center –Representative for B.Ed program)*."

A blended learning environment incorporating ICT can present large volumes of learning material, provide for different styles of student learning and engage learners interactively [18; 19; 20; 21; 22; 23; 24].

Most of the students who are coming from economical weaker backgrounds, ICT based education is the easiest mode of knowledge sharing.

"I always wish that such program should not only confide to the educational institutions. NGO's and other socially active institutions should generate awareness amongst the local mass on the benefits offered by Ministry and Institutions like IIT's and NITTTR who are serving the cause of education selflessly especially when to take education from such Institutions is every student's dream". Dr. S. S. Yadav, CEO Thar India (Thar India is an NGO. The NGO has conduct educational drives in rural Rajasthan state of India).

Socio-Cultural factors often have tremendous impact on the teaching and learning styles [1]. Educational Institutes should adopt a holistic approach in designing the learning environments where there is an integration of ICT, management and design [25]. A thorough understanding of the student's background is very essential before designing the learning process and setting up the infrastructure [1]. Under mentioned are the post program views of a participant of researcher's network center on an ICT based short term training program on 'Communication Skills'. The program has been conduct in association with the National Institute of Technical Teachers Training & Research, Chandigarh from 17 Feb- 21 Feb 2014.

"The excellent planning, realistic scheduling resulted in outstanding cognitive affective and psychomotor learning experience for my pupil" Dr. Ritu Gaur (Associate Professor & Head, faculty of Education. Dr Ritu preferred to send B.Ed participants to participate in Spoke tutorial project workshops at the Resource Center)."

Reference [18] questioned if technologically-enhanced learning systems were really flexible enough to meet the design requirements of an effective learning system. In this context, the students' ability range, level of staff support required and the complexity of students' needs might be underestimated. Technical limitations, reliability and technical quality have also been found to impact on students' attitudes and willingness to engage with such learning methods, especially where systems are perceived to be unreliable or the learning products are considered to be amateurish [18], [23].

"The Spoken Tutorial Workshops are much appreciated by our students …. the online process of registering is smooth and passing certificates are provided instantly online. The

program participation is free of cost. I personally suggest that these tutorials should also include the university course content." Mr. Tarun Awasthi (Resource Center – Representative for MCA program. The above statement is the post program view after organizing and conduct of test for students through ICT by IIT-B, Spoken Tutorial Project'.)"

"I have always been in support of the conduct of ICT based programs which increase my students' employability *(Associate Professor & Head, faculty of Computer Applications. Prof Naveen Chandra preferred to MCA and BCA students to participate in Spoke tutorial project workshops at the Resource Center).*

Loneliness and isolation, lack of motivation, poor communication, fear of online communication and lack of guidance by teachers are reported as issues in online learning [26].

Role of Infrastructure: For the purpose of programs cover under present study the source organization forward the Infrastructure and internet connectivity requirements as a prerequisite to register and conduct these ICT based programs also for some program video conferencing facility provided by a well-known search engine has been taken. During the conduct of these programs the general experience on the quality Powerful broad band networks are crucial for getting an edge in the knowledge economy and countries should give significance and consider broad band networks as part of basic infrastructure [27]. Government through educational institutions has a major role in providing the infrastructure and providing ICT technologies to Schools, Universities and Colleges [1].

V. Conclusions

It was found that students generally liked using the videos which are available online. The students also recommended that videos should be shorter. ICT content gave them more choice, control, accessibility and depth. However, students missed the social interaction and motivation provided by the lecture and the opportunity to ask questions or hear the responses to questions asked by others. The general view was that students prefer to print an article and read it in paper format as this permits them to highlight focus content. This suggests that a new simulation or other on-line activity cannot simply be inserted into the subject content. Rather, the full curriculum will need to be reviewed and harmonized with the non-traditional content if the full benefits of blended learning are to be achieved.

References

[1] Purushothaman, Role of ICT in the education Up-liftment of women Indian Scenario. [Online]. Available: www.vbn.aau.dklfiles162866817/Role_ of_ ICT_ in_ the_Educational_upliftment_of_women_Indian_ScenarioIEEEXplore .pdf

[2] L. McKeown, A. Noce, and P. Czerny, "Factors Associated with Internet Use: Does Rurality Matter?" *Rural and Small Town Canada Analysis Bulletin, Catalogue no. 21-006-XIE.*

[3] A. Singh. Information and Communication Technologies (ICT) and sustainable development. [Online]. Available: www.ceeindia.org/esf/download/paper28.pdf

[4] Mission Document, National Mission on Education through Information And Communication Technology. Government of India. [Online]. Available: www.sakshat.ac.in/document/Missiondocument.pdf

[5] E. Sklar, and J. Pollack, "A framework for enabling an internet learning community," *Educational Technology and Society*, vol. 3, no. 3, pp. 1436-4522, 2000.

[6] S. L. Edwards and C. S. Bruce, "Reflective internet searching: An action research model," *The Learning Organization: An International Journal*, pp. 180-188, 2002.

[7] S. Jane and L. Matt, "Developing students' information management skills to match the 21st century internet," in *Proc. Futureproof: Making Libraries Indispensable to Learning, Teaching and Research* 2010.

[8] K. Laudon and J. Laudon, *Essentials of Management Information Systems*, 5th ed. Upper Saddle River, NJ: Prentice-Hall, 2003.

[9] C. J. Bonk and C. R. Graham, *Handbook of Blended learning: Global Perspectives, Local Designs*, San Francisco, CA: Pfeiffer Publishing, 2006.

[10] J. C. Moore. ALN principles for blended environments: A collaboration. *The Sloan Consortium.* [Online] Available: www.sloan-c.org/publications/books/alnprinciples2.pdf

[11] L. N. Edwards, "Conducting focus groups," *ASTD Handbook of Measuring and Evaluating Training*, 2015.

[12] N. Love and N. Fry, "Accounting students' perceptions of a virtual learning environment: springboard or safety net?" *Accounting Education: An International Journal*, vol. 15, no. 2, pp. 151–166, 2006.

[13] N. Marriott, P. Marriott, and N. Selwyn, "Accounting undergraduates' changing use of ICT and their views on using the Internet in higher education – a research note," *Accounting Education: An International Journal*, vol. 13, no. 1, pp. 117–130, 2004.

[14] ICT Programs: *ICT Programs conduct by the author as RESOURCE and Network Centre Head / Coordinator;* The experience & observations made during the conduct of the under mentioned programs, feedback received from the participants of the under mentioned programs is the primary source of the data for the present paper.

[15] Spoken Tutorial Project IIT Bombay, Student workshop and test at 2 star rating RESOURCE center DVSGI from January 2013- April 2014.

[16] Virtual Labs Project IIT Delhi, 2013, Training Workshop for MCA and B.Tech students,Trainer –Project Engineer and Field trial Incharge Engineer Tanmay Tarun Das ,Eng. Bira Bhairav Chandra Patra, Eng. Harshdeep Singh Sodhi, Eng. L.N. Mahapatra at DIMS & DVSIET Campus, network center coordinator Dr. Ruchi Tyagi,03 October 2013 certifying the DVSGI as Nodal center up to October 2014.

[17] S. Kumari, Teaching with the internet. *Technology, Pedagogy and Education*, pp. 363-377, 1998.

[18] F. Concannon, F. Flynn, and M. Campbell, "What campus based students think about the quality and benefits of e-learning," *British Journal of Educational Technology*, vol. 36, no. 3, pp. 501–512, 2005.

[19] T. Connolly, M. Stansfield, and E. McLellan. "Using an online games based learning approach to teach database design concepts," *The Electronic Journal of e-Learning*, vol. 4, no, 1, pp. 103–110, 2006.

[20] P. De Lange, T. Suwardy, and F. Mavondo, "Integrating a virtual learning environment into an introductory accounting course: determinants of student motivation," *Accounting Education: An International Journal*, vol. 12, no. 1, pp. 1–14, 2003.

[21] R. Hall, "Delivering what students say they want on line: towards the academic participation in the enfranchisement of learners," *Electronic Journal of e-Learning*, vol. 4, no. 1, pp. 25–32, 2006.

[22] G. Kirkpatrick, "Online 'chat' facilities as pedagogic tools: a case study," *Active Learning in Higher Education*, vol. 6, no. 2, pp. 145–159.

[23] N. Robson and J. Greensmith, "Educational podcasts: some early evidence and thoughts," *International Journal of Management Education*, vol. 8, no. 3, pp. 107–117, 2009.

[24] R. Sharpe, G. Benfield, G. Roberts, and R. R. Francis, "The undergraduate experience of blended e-learning: a review of UK literature and practice," *Higher Education Academy* , 2006.

[25] D. B. Zandvliet and B. J. Fraser, "Learning environments in information and communications technology classrooms," *Technology, Pedagogy and Education*, vol. 13, pp. 97-123. 2004

[26] J. H. Hanisch, M. Caroll, B. Combes, and A. A. Millington, [Online] LIS education: Towards the right balance of flexibility and engagement. Available: www.slideshare.net/RAILS7/online-lis-education-towards-the-right-balance-of-flexibility-and-engagement

[27] *GIT Report*, ICT for Sustainability, World Economic Forum, 2009–2010.

Ruchi Tyagi was born in India, Ruchi has degree in science, MBA in HR management, diploma in labour laws, a master's in journalism and mass communication, and a PhD in management.

She has been in academic for more than 12 years, presently working as Assistant Professor (Selection Grade) at CMES- University of Petroleum & Energy Studies, Dehradun, India. She is a visiting faculty at few European universities. She has coordinated several ICT programs in the past years.

Ginni Chawla is a permanent faculty at Department of HR and OB, UPES, Dehradun, India. Prior to joining UPES, she was a full time research scholar at MNNIT, Allahabad, India. She has MBA in HRM and Ph.D. in Industrial Relations.

Ginni has been the recipient of national and international awards for paper presentations made at conferences within and outside India. To her credits, she has publications in various reputed international journals. Her broad areas of interest include: Industrial relations, QWL, Employability, Innovative HR.