ACCEPTANCE OF TECHNOLOGY ENHANCED LEARNING: A STUDY AMONG TECHNICAL STUDENTS IN INDIA

A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE

FELLOW PROGRAMME IN MANAGEMENT (INDUSTRY)

INDIAN INSTITUTE OF MANAGEMENT INDORE

BY

JYOTSNA SINGH

MARCH 2016

THESIS ADVISORY COMMITTEE

PROF. PRABIN K. PANIGRAHI
[CHAIR]

PROF. SUSHANTA KUMAR MISHRA
[MEMBER]

PROF. SANJOG RAY
[MEMBER]

DECLARATION

I hereby declare that this thesis is my original research work and wherever others ideas or words have been included I have indicated this clearly, with proper reference to the literature and have acknowledged related research and discussions. I have adhered to the principles of academic honesty and integrity and have not misrepresented any fact and source in my written submission.

(Jyotsna Singh)

ABSTRACT

Rapid evolution and ubiquitous presence of the information and communication technology (ICT) has touched every domain inclusive of education. Increasingly Higher Education Institutes (HEIs), worldwide are adopting ICT in various forms to improve learning and teaching experiences of their students and teachers. As compared to traditional classroom settings, technology enhanced learning (TEL) can overcome the limitations of traditional learning and expand the educational territories without barriers of time, distance, and space. In fact the accessibility of the Internet, Open Educational Resources (OERs) and the launch of Massive Open Online Courses (MOOCs) by reputed universities have made quality education accessible at almost no cost to all learners anytime anywhere.

However, simply providing learners with a Web-based learning system does not guarantee usage and effective learning. The continuous growth of virtual learning environment has been debated for its effectiveness and has received fairly extensive attention from practitioners and information system (IS) researchers in the form of comparison of effectiveness of face to face (F2F) lectures with online learning, factors for acceptance of technology for learning and its impact, teachers' use of technology and whether media can influence learning and so on. Past studies have provided mixed results.

As compared to developed countries, the use of ICTs in academia has not spread in most HEIs of developing countries owing to many socioeconomic and technological situations. In India, traditional methods of F2F teaching and mentoring is dominant in HEIs, but the emphasis is towards up gradation of ICT infrastructures, multimedia enabled classrooms, digitization of library contents and 24x7 access of the Internet to students in campus. The importance of OERs has been recognized by India too, and various programs like the Open Source Courseware Animations Repository, the National Science Digital Library, National Programme on Technology Enhanced Learning (NPTEL), 'Sakshat'- a one

stop educational portal and a recently launched MOOC platform named '*Swayam*' are the prominent initiatives taken by Indian government. Along with the access to high quality internet in the campuses of HEIs the students are becoming 'tech savvy'. All this leads to widespread use of internet by students of HEIs in India. In fact, Indian college students also represent the second largest percentage of MOOCs' students. As the widespread use of technology for learning increases, so does the need to assess factors associated with its acceptance by learners.

It is found from literature that most of the studies in past covers acceptance of virtual learning environment (VLE) or TEL implemented and mandated by the institute for formal learning in developing countries. Hence, despite much of the research on acceptance of VLE, it is believed that there are many avenues still remained unknown with potential to explain the learners use of TEL in voluntary mode, especially in developing nations. In the present work we are exploring the factors of acceptance of TEL resources in voluntary mode to supplement study outside classroom by technical students in Indian context. Although factors for acceptance of online learning has got quite a focus in IS research area, we did not find relevant literature in the context of acceptance of educational resources in the open domain on the Internet (TEL resources) in the voluntary mode to supplement study outside classroom by college students.

The academic literature has discussed various aspects of technology acceptance. Two well-known research frameworks in this area are Diffusion of Innovation (DOI) Theory and Social Cognitive Theory (SCT). DOI explains that how technological characteristics of a new innovation, influence the users' intention to adopt/accept the technology. Past studies found relative advantage and compatibility influence the technology adoption most. SCT on the other hand explains how self efficacy beliefs of an individual, influences intention directly as well as indirectly, through outcome expectations from the behavior

Apart from the domain of technology acceptance a second important research domain which is closely associated with usage of open resources on the Web is 'information retrieval (IR) on the Web ' as the usage of open educational resources on the Internet goes through a complete process of information behavior (need – seek/retrieve – use cycle) on web by students. Past studies have found that information quality and authority of information source are two consistent factors which are used by information seekers (students, here) for making judgments for relevance and decision about usage of an open resource for the Web. Another significant stream of literature on education and learning psychology explore the factors leading to students' physical and mental involvement in study outside class. Education researchers have found that interest in a 'domain' (or 'subject) and perceived importance (or task utility) can help a student choose to become more involved in a learning task.

Despite plentiful studies in the online learning domain, studies to assess the factors of acceptance of open online learning resources, voluntary for supplementing study by college students are in paucity. This study integrates the theory of information retrieval on Web with those of technology acceptance and also includes few situational factors from educational psychology. The study also proposes that 'resource constraints' in using textbooks (incumbent behavior[1]) has an impact on the acceptance of TEL (new behavior) as both the behaviors are being used as alternates for study outside class by the students. In fact acceptance of TEL for study only partially replaced the behavior of study using textbooks. This students has also proposed a new measure for TEL self efficacy as none of the existing scales were found suitable to the context. Total nine factors (compatibility, relative advantage, TEL self efficacy, subjective norm, information quality, perceived constraints of incumbent behavior, prestige of source institution, a student's interest in the subject and perceived importance of the subject for the course) are hypothesized to influence intention to

[1]Students may use different behaviors for study outside class in campus but this study focuses on two major behaviors for study by students: i) incumbent or traditional behavior of study using Textbooks and ii) new behavior of study using TEL resources.

use TEL resources for study in the proposed research model.

As the phenomenon is not explored in the existing literature an exploratory study was conducted on technical students in India through semi structured interviews and content analysis of the interview texts. The findings of the qualitative study suggest that Net generation students seek information on topics of their syllabus on the Web and when matching or compatible contents are found, then judgments of quality is carried out for decision on selection (or rejecting) of the content for use. The students also find studying with TEL resources relatively advantageous (anywhere and anytime access, recent contents, video cognitively easier to understand) than using textbooks.

Students reported that they comfortably read online digital contents, get motivation for usage from friends and from teachers, seek and use contents vigorously for the subjects/domain of their interest and for subjects of relative importance in the course. One important finding was that as usage of TEL to supplement study is perceived as an alternate to using textbooks, students still very much use textbooks for study. Students also revealed that sometimes the availability of textbooks for study is problematic due to high cost or non availability in the library / market which also influences seeking and using TEL resource. The first phase of the qualitative study has contributed in exploring in depth the phenomenon of acceptance of TEL resources, voluntary for study by college students in India.

The findings of the exploratory study when compared with the literature provided input for our quantitative research model. We collected data from 556 technical students through survey to test the research model. Data was obtained using both pen and paper and web based survey. Our hypotheses affirm that perceived relative advantage, compatibility of TEL resources, TEL self efficacy and subjective norm have direct influence on acceptance of TEL. Student's perceived importance and interest in the subject also found impacting in moderating modes. Relative advantage was found to mediate the effect of TEL self efficacy,

resource constraint (incumbent behavior) and compatibility. In general, the results of PLS-SEM analysis supported the majority of hypotheses of the model except a few exceptions. The results from this study will have managerial and research implications.

This study will improve our understanding of college students' study behavior. The significance of involvement in study by college students on campus has been found critical for retention and successful learning in literature. However, academic literatures have explored contradictory outcomes of usage of TEL/VLE among college students and explicated numerous antecedents and consequences of the acceptance and usage. Despite much research on TEL/VLE acceptance there is a constant call for research work explaining the perceptions of college students on usage of online courses, voluntary or mandatory as technology in this area is continually evolving and diffusing to new geographic areas and populations worldwide. The present research, addressing the gap, proposes a model by integrating theories from different research areas explaining the factors for acceptance of TEL and validates it empirically.

The study also paves path for new research areas like explaining the phenomenon of TEL acceptance from the viewpoint of information retrieval, introducing new situational variables in moderating effect from educational psychology, answering calls to study incumbent behavior's effect on new technology acceptance which is very nascent in the technology acceptance field. Importantly, it draws attention to the significance of students' perceptions of usage of TEL voluntary, their study behavior using TEL and antecedent factors thereof, which can be used by policy makers, teachers and educational technologists to provide a positive learning environment in college campus to enhance students' experience and outcomes of learning which is the prime objective of an academic institution.

ACKNOWLEDGEMENT

First and foremost, I would like to thank my thesis Chair, Professor Prabin Kumar Panigrahi, for his guidance, support, motivation and tolerance over last few years. I would also like to convey my sincere gratitude to Professor Sushanta Kumar Mishra and Professor Sanjog Ray for being in my thesis advisory committee and for the valuable guidance they provided at every stage of my research. Apart from my TAC, I would like to thank all my teachers, including professors in IIM Indore who taught me and shared their invaluable knowledge. FPM office, library, IT department and hostel officials have provided excellent support throughout these years and I would like to thank them all.

Next, I would like to thank my batch mates and FPM students who shared their experience and research knowledge with me. I also got immense help in data collection from many professors of various institutes and from my friends and I would like to acknowledge their help with gratitude. Especially I like to thank Professors: Baisakhi, Chittatosh, Piyush, Lata, Rohini and Hemant for their initiative, time and help provided to me in data collection and I must say that I could not have achieved my target of data collection without their help. I also thank all the participants of survey who spared their valuable time for my research.

I would also like to thank my family members (my respected parents and parents–in–law, brothers/in-law, sisters-in-law, my sons and my husband), for their encouragement and help and for the adjustment of their needs to provide me extra time needed for my thesis related work.

Finally, I thank God who blessed me with conscience, a wonderful family and associated me with such amazing people during the journey of my research.

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LIST OF ABBREVIATIONS

AICTE	All India Council for Technical Education
ASE	Academic Self Efficacy
AVE	Average Variance Extracted
BE	Bachelor of Engineering
BI	Behavioral Intention
CA	Content Analysis
CAL	Computer Assisted Learning
CB-SEM	Co-Variance based Structural Equation Modeling
CMV	Common Method Variance
COL	Commonwealth of Learning
CSE	Commputer Science and Engineering
DOI	Diffusion of Innovation
DTPB	Decomposed Theory of Planned Behaviour
EAG	Educational Statistics at a Glance
ECE	Electronics and Communication Engineering
EE	Electrical Engineering
ESL	English as Foreign Language
F2F	Face to Face
GOI	Government of India
H/W	Hardware
HBR	Harvard Business Review
HE	Higher Education
ICT	Information and Communication Technology
IDT	Innovation Diffusion Theory
IISc	Indian Institute of Science
IIT	Indian Institute of Technology
ILM	Internet-based Learning Medium
IQ	Information Quality
IS	Information System
IS Success Model	Information System Success Model
IT	Information Technology
JISC	Joint Information System Committee
JP	JayPrakash
KMS	Knowledge Management System
LAN	Local Area Network
LUOERL	Learner Use of Open Educational Resources(OER) for Learning
MGA	Multi Group Analysis
MIT	Massachusetts Institute of Technology
MOOC	Massive Open Online Courses
NASSACOM	National Association of Software for commerce

NBA	National Board of Accreditation
NIT	National Institute of Technology
NKC	National Knowledge Commission
NKN	National Knowledge Network
NMEICT	National Mission in Education through ICT
NPTEL	National Programme for Technology Enhanced Learning
OCW	Open Course Ware
OER	Open Educational Resources
PC	Personal Computer
PEOU	Perceived Ease of Use
PG	Post Graduate
PGDC	Post Graduate Diploma Course
PLS	Partial Least Squares
PLS-SEM	Partial Least Squares - Structural Equation Modeling
PU	Perceived Usefulness
RC	Resource Constraint
RSS	Really Simple Syndication
S/W	SoftWare
SCT	Social Cognitive Theory
SD	Semantic Differential
SEM	Structural Equation Modeling
SN	Subjective Norm
SWAYAM	Study Web of Active-Learning for Young Aspiring Minds
TAM	Technology Acceptance Model
TEL	Technology Enhanced Learning
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
TSE	TEL Self Efficacy
TTF	Task Technology Fit
UGC	University Grant Commission
UK	United Kingdom
UNESCO	United Nations Educational, Scientific and Cultural Organization
USICA	University and College Information System Association
UTAUT	Unified Theory of Acceptance and Use of Technology
VAF	Variance Accounted For
VLE	Virtual Learning Environment
WBLE	Web Based Learning Environment
WWW	World Wide Web