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FACTORS THAT AFFECT INFORMATION AND COMMUNICATION TECHNOLOGY USAGE: A CASE STUDY IN MANAGEMENT EDUCATION

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ABSTRACT

Information and communication technology (ICT) which includes radio, television and newer digital technology such as computers and the internet, are potentially powerful tools for extending educational opportunities, formal and non-formal, to one and all. It provides opportunities to deploy innovative teaching methodologies and interesting material that creates an interest in students. This study is to determine the critical factors that impact the effective use of ICT in management education from students' and teachers' perspective, and to identify the expectations and gaps in its use in management education. A questionnaire-based survey was conducted and the perception of various stakeholders of the importance of these factors was analyzed. The study was conducted at various management institutes across the city of Navi Mumbai. Data analysis revealed that various categories of respondents gave significantly different importance to factors relevant for the effective use of ICT. Notably, there was a significant gap between the respondents' expectations and the actual satisfaction with the current usage of ICT. Certain factors which appeared to be barriers towards ICT usage were also found from the analysis. The findings could be useful to any management institution which is thinking of making effective use of ICT in its curriculum.

Keywords: ICT, information technology, communication technology, critical factors, management education

INTRODUCTION

Information and Communication Technology continues to be commonly used for global communication and productivity. Since the earliest use of the World Wide Web for teaching and learning, one of its most powerful elements has been the ability to engage learners in an interactive format [3,8]. Schrand [18] suggests the use of technology in education has several benefits for motivating students. Schrand further states that technology can facilitate more active student learning in the classroom, and appeal to multiple intelligences, and

different learning styles. Jonassen, Howland, Marra and Crismond [9] state that technology can be only effective in the learning process when it meets a learning requirement. Access to technology related multimedia has previously been shown [1] to improve cognitive engagement and cognitive absorption in users. Great expectations have emerged for technological advances to meet society's demands in new way. Many universities and private corporations are investing significant capital in e-learning systems [13]. A variety of these higher education institutions are driven by an enormous increase in the global demand for higher education, which provides new opportunities to contribute to the educational process.

However, as many projects such as the UK e-University, NYU Online, Scottish Knowledge, Universities 21 and Global University Alliance (GUA), which all developed around e-learning applications, have failed to realize their aims and goals, leading many to question the quality and capabilities of this form of education. Full understanding of the factors contributing to effectiveness of e-learning systems will help E-Universities and institutions channel funding to effective factors and redesign or eliminate non-effective factors (Levy, 2006).

In this paper we are not restricting to only e-learning, but widening the scope to include the all information technologies and communication technologies that are or can be used in education. Critical factors can be viewed as those activities and constituents that must be addressed in order to ensure its successful accomplishment and acceptance by the various stakeholders. This is an empirical study to find out what would make ICT usage in management education effective from the students and teachers perspective.

LITERATURE REVIEW

A broad range of factors that can influence the use of technology in learning has been mentioned in the literature. Successful implementation of ICT change is not about equipment or software but influencing and empowering teachers; it is not about acquiring computer skills but supporting teachers in the ongoing engagement with students in their learnings [21]. A study was conducted by Neset Hikmet, Eileen Z. Taylor and Christopher J. Davis [14] in 2008 in US. They concluded that before investing heavily in ICT, school administrators should appreciate that the nature of 'productivity' in learning is elusive. Their study provided some well-reasoned empirical evidence that highlights that the specific needs and expectations of students, teachers, parents and administrators who adopt ICT for use in education should be studied as the outcomes of investments in ICT are uncertain and may not always align with the intentions of school administrators. Another study conducted by Michael Laff [11] in Princeton in 2007 compared the learning preferences of IT professionals with professionals from other sectors and found that while training professionals in other fields are wrestling with the best way to offer active learning in the digital age, intensive classroom curriculums are still widely available for IT professionals. Online training, blended learning and other upstart methods may be the future as many organizations move away from traditional classroom instruction, but in the IT field, instructor- led training remains the preferred method for many applications. The study says the ideal way to offer blended learning to IT workers would be four weeks of classroom instruction with participant interaction and then four weeks participants working on their own to build skills and learn techniques. Study conducted by Nor Shariza Abdul Karim[15] (Malaysia) and Robert Heckman(USA) in 2005 said that "*The learning industry is undergoing a transformation process through the use of innovative products and tools from the ICT revolution. However it is important that the tools are evaluated for appropriateness, effectiveness and usability from the user's point of view. This understanding can assist educators in choosing the best product and in managing the tools for optimum benefit."* They investigated group communication media choice and the use of a web-based learning tool, as well as other types of communication media such as email, telephone and face-to-face, for communication and collaboration to complete given tasks. The study conducted by Phil Banyard and Jean Underwood in 2007 [2] captured teachers' perceptions of support for and attitudes towards use of ICT in their school and also the degree to which they were encouraged and had responded to the personalisation of teaching and learning. The result showed that while teachers were positive about both the personalisation agenda and the role of ICT in delivering that agenda, there were significant inter-subject differences with mathematics teachers seeing the least value of the personalisation policy and design and technology teachers being unconvinced by the value of ICT. Another study conducted in UK in 2004 by Gordan Graham [6] says that before using or discarding any technology, the following questions should be answered: *What is the anticipated benefit of the innovation and will it be genuinely additional benefit? Is the chance of it being implemented successfully higher than the chance of its failure? What is the cost of its introduction in terms of disruption to the existing systems that are tried, known and reliable? Are there recurrent patterns of behavior that would give some pointers to its likely reception?*

Based on the insights obtained from the study by The Institute for Higher Education Policy in 2000, the key factors for successful e-learning environments are - Institutional Support, Course Development, Teaching/Learning Process, Course Structure, Student Support, Faculty Support, Evaluation and Assessment. According to Papp's study [17] e-learning critical success factors included intellectual property rights, suitability of the course for e-learning environment, building the e-learning course, e-learning course content, e-learning course maintenance, e-learning platform, and measuring the success of an e-learning course. He suggested studying each one of these imperative factors in isolation and as a composite to determine which factor(s) influence and affect e-learning success. Thierry Volery [20], based on an empirical study among college students, suggested a framework for the critical success factors in online education, focusing on three aspects in e-learning - Technology (ease of access and navigation, interface design and level of interaction), the instructor (attitudes towards students, instructor technical competence and classroom interaction) and the previous use of the technology from a student's perspective or students previous computer knowledge. Soong, Chan, Chua, and Loh [19] using a multiple case study, verified that the e-learning critical success factors are: human factors, technical competency of both instructor and student, e-learning mindset of both instructor and student, level of collaboration, and information technology infrastructure. They recommended that all these factors should be considered in a holistic fashion by e-learning adopters. Graf and Caines [5] in "WebCT Exemplary Course Project" developed a scoring rubric to evaluate online courses. They presented criteria in two categories: academic rigor (10 items) and content robustness (6 items). Academic rigor includes items such as course objectives, assignments, student participation, use of technology, course content, and ancillary resources. Content robustness refers to the degree to which the course content is available online, how it is structured, the use of images and graphics, the degree of interaction among students and with the lecturer and the type and quality of student assessment. Oliver [16], in "Assuring the Quality of Online Learning in Australian Higher Education", addresses the major issues confronting the successful adoption and sustained use of e- learning in Australian higher education context. Factors to support and sustain quality in e-learning programs are: Teacher expertise in online teaching, Student readiness to move online, Technology infrastructure, Provision of content and learning resources, Instructional design. In an attempt to provide a pedagogical foundation as a prerequisite for successful e-learning implementation, Govindasamy [7] discussed seven e-learning critical factors namely, institutional support, course development, teaching and learning, course structure, student support, faculty support, and evaluation and assessment. Fresen [4] in an inclusive study highlighted six critical success factors in his study:

Institutional factors (Technology plan, Infrastructure, Student advice and consultation, Institutional evaluation of the program effectiveness), Technology factors (Reliability, 24X7 availability, Technical support for lecturers and students, System training for lecturers and students, appropriate use of technology, accurate management of student records/data), Lecturer factors (Interaction with students, Frequent and constructive feedback to students, qualifications, professional development), Student factors (Communication with fellow students, Time management, Learner control over time, place, pace of learning, Expectations of efficiency and effectiveness, Employ critical thinking strategies, Motivation/commitment/self esteem, Improve problem-solving abilities), Instructional design factors (Group learning, Student engagement in higher cognitive levels, Rich learning resources, Active learning, Enhanced student motivation, Design standards, Manageable segments, Including social, cultural, gender, disabilities, Routine review and evaluation of courses, Purposeful use of learning media, Minimize student frustration, Appropriate use of images, graphics, Offer a complete learning package, Appropriate layout and presentation, Appropriate bandwidth and download demands), Pedagogical factors (Offer multiple paths for recursive learning, Provide a learner-centered environment, Students instructed in proper research methodology, Relevance and accuracy of content, Currency of learning resources and content, Research and continuous improvement).

Khan [10] identified various critical factors for successful e-learning. He clustered critical success factors in the following categories- Institutional factors include assessment, financial readiness, infrastructure readiness, cultural readiness and content readiness; Management factors include management team, managing content development process, and managing delivery and maintenance.

Technological factors cover infrastructure planning, hardware, and software; Pedagogical factors include content analysis, audience analysis, goal analysis, medium analysis, design approach, organization and learning strategies; Ethical factors comprise social and political influence, cultural, diversity, bias, geographical diversity, learner diversity, digital divide, etiquette and legal issues; Interface design factors include page and site design, content design, navigation, accessibility, usability

testing, resource support, online support, online resources and offline resources; Evaluation factors include evaluation of content development process, evaluation of e-learning environment, evaluation of e-learning at the program and institutional levels, assessment of learners.

RESEARCH OBJECTIVES

The study has the following objectives:

1. To determine, from literature, the critical factors which have impact on the effective use of ICT in management education.
2. To determine which factors, among many, are given more importance by students and teachers.
3. To determine the satisfaction level, among students and teachers, with the current usage of ICT in their institution.
4. To identify the gaps in the expectation and actual satisfaction levels in the use of ICT in management education.
5. To determine the difference in perception of respondents based on stakeholder (teacher-student), undergraduate degree, institute/college and post graduate specialization, in terms of the importance they give to the various factors and satisfaction from the current usage in their institutes.

RESEARCH METHODOLOGY AND RESEARCH HYPOTHESIS

A questionnaire based survey was conducted at a management institution in a metropolitan city of India. The respondents were students and teachers of this institution. The questionnaire had a list of factors that are relevant for ICT usage in education. These factors were found out after a thorough literature review.

The questionnaire was divided in three parts – in the first part the respondent was asked to fill in the demographic details. In the second part the respondent was asked to fill, using Likert scale (rating 1-5), how much importance they gave to each of the specified factors. In the last part of the questionnaire, the respondent was asked to fill in their satisfaction level, on a scale of 1-5, for the current ICT usage in their institution based on the same factors.

Besides the above give objectives, the following hypothesis would also be tested:

H_{10}: There is no significant difference in the perception of respondents on the importance given by them to the various factors based on their undergraduate background such as Science, Arts, Commerce, BBA/BMS, Engineering, BCA, LLB and Medical.

H_{20}: There is no significant difference in the perception of respondents on the importance given by them to the various factors based on their PG specialization such as HR, Marketing, Finance, Systems, Biotech and Operations.

H_{30}: There is no significant difference in the perception of respondents on the importance given by them to the various factors based on their PG college.

ANALYSIS

Collecting information from all these studies, an extensive list of critical factors for successful ICT implementation was arrived at. There were 35 factors that can affect the use and 20 outcomes of using ICT as given below:

The questionnaire was administered to 458 respondents from 5 colleges. It included 57 teachers and 401 students from different streams of management such as HR, Marketing, Finance, Biotechnology, systems and operations. In the first section, respondents were asked to fill in their names, age group, gender, educational qualifications and specialization. The second section had a list of factors that would affect the use of ICT in management education. The respondents were requested to rate these factors on a scale of 1-5 (Likert scale) with 1 for not at all important, 2 for not important, 3 for neutral, 4 for important and 5 for very important. In this section, the outcomes of using ICT were also listed and the respondents were asked to rate these as per their importance starting with 1 for not at all important and going to 5 for very important (Likert scale). In the third section, the factors and outcomes were listed again. Here, the respondents were asked their satisfaction level for these factors and outcomes for the current usage of ICT in their institute. The rating was done using Likert scale of 1-5 with 1 being not at all satisfied and 5 being highly satisfied. SPSS was used for data analysis.

The respondents were asked to rate these factors for their importance. Mean for the importance of each of these factors, as given by the respondents, was calculated. The respondents were also asked to rate these factors for satisfaction with the current usage in their institutes. Mean of satisfaction was also calculated. The difference between the importance given and the satisfaction was then calculated. The values obtained are shown in Table 1.

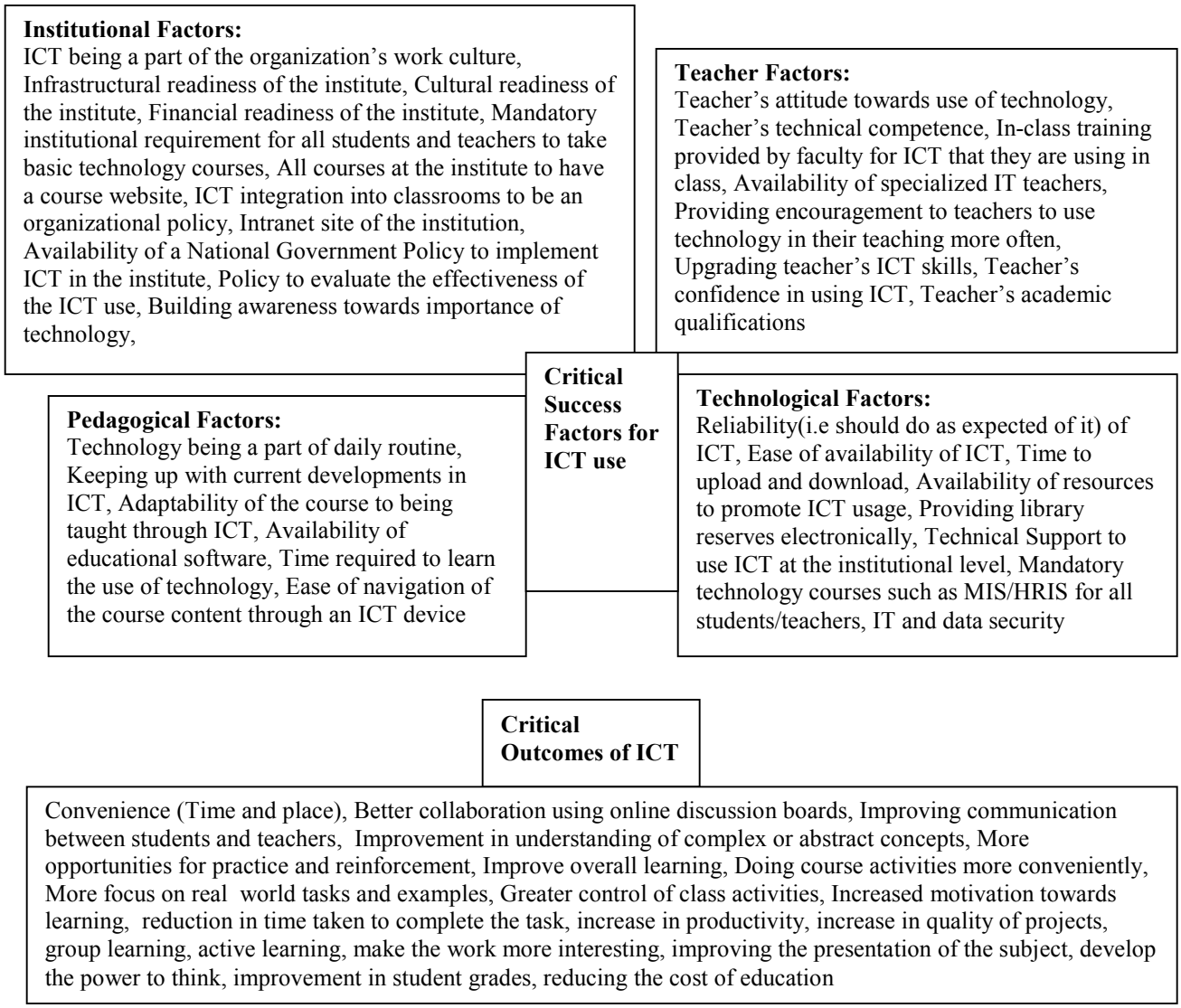

Figure 1: Factors and outcomes that would affect ICT usage

Table 1: Difference of mean of importance and mean of satisfaction for all factors/outcomes, given to them by the various stakeholders (sorted in descending order of importance)

Factor	Mean(μ_e)	Mean(μ_s)	Mean(μ_s) - Mean(μ_e)
Time to upload and download (speed)	3.56	2.44	-1.12
Ease of availability of ICT	3.52	2.55	-0.97
Reliability (i.e. should do as expected of it) of ICT	3.46	2.54	-0.92
Increase in quality of projects	3.45	2.7	-0.75
Convenience (time and place)	3.44	2.61	-0.83
Increase in efficiency	3.43	2.65	-0.78
Improving the presentation of the subject.	3.42	2.87	-0.55
Improving communication between students and teachers	3.41	2.66	-0.75
Increase in productivity	3.41	2.7	-0.71
Teacher's technical competence	3.4	2.62	-0.78
Make the work more interesting	3.4	2.75	-0.65
IT and data security	3.39	2.65	-0.74
More focus on real-world tasks and examples.	3.39	2.68	-0.71
Improve overall learning.	3.39	2.7	-0.69
Upgrading teacher's ICT skills	3.38	2.57	-0.81
Availability of specialized IT teachers	3.37	2.62	-0.75
Providing students more opportunities to use technology in their coursework.	3.36	2.63	-0.73
Allow active learning	3.36	2.75	-0.61
Financial readiness of the institute to support ICT	3.34	2.51	-0.83
Infrastructural readiness of the institute to support ICT	3.34	2.54	-0.8
Availability of Educational software	3.34	2.55	-0.79
Develop the power to think	3.33	2.7	-0.63
Ease of learning technology.	3.32	2.63	-0.69
Improvement in understanding of complex or abstract concepts.	3.31	2.51	-0.8
More opportunities for practice and reinforcement.	3.31	2.58	-0.73
ICT being a part of the organization's work culture	3.31	2.63	-0.68
Keeping up with current developments in ICT.	3.3	2.53	-0.77
Reducing the cost of education	3.3	2.66	-0.64
Intranet site of the institution	3.29	2.53	-0.76
Technical support to use ICT at the institutional level	3.27	2.48	-0.79
Ease of navigation of the course content through an ICT device	3.26	2.57	-0.69
Adaptability of the course to being taught through ICT	3.25	2.58	-0.67
Providing encouragement to teachers to use technology in their teaching more often.	3.25	2.63	-0.62
Building awareness towards importance of Technology	3.25	2.66	-0.59

Table 1 (continued)

Factor	Mean(μ_e)	Mean(μ_s)	Mean(μ_s) - Mean(μ_e)
Improve group learning	3.25	2.73	-0.52
Availability of resources to promote ICT usage	3.24	2.5	-0.74
Increased motivation towards learning	3.24	2.63	-0.61
Better collaboration among teachers using online discussion boards	3.23	2.49	-0.74
Mandatory institutional requirement for all students and teachers to take basic technology courses.	3.23	2.55	-0.68
Technology being be a part of daily routine	3.22	2.76	-0.46
In-class training provided by the faculty for ICT they are using in class.	3.21	2.57	-0.64
Providing library reserves electronically.	3.2	2.37	-0.83
Improvement in student grades	3.2	2.66	-0.54
Greater control of class activities	3.17	2.6	-0.57
All courses at the institute to have a course website.	3.12	2.32	-0.8
Cultural readiness of the institute to support ICT	3.12	2.53	-0.59
ICT integration into classrooms to be an organizational policy	3.03	2.52	-0.51
Policy to evaluate the effectiveness of the ICT use	3.02	2.43	-0.59
Mandatory technology courses such as MIS, HRIS for all students/teachers	3	2.45	-0.55
Use by peers	2.97	2.62	-0.35
Availability of a National Government Policy to implement ICT in the institute	2.89	2.35	-0.54

The following can be seen from the table:

1. All the factors/outcomes that were found to be important for ICT usage were not given equal importance by the stakeholders. Some of the factors/outcomes were given a lot of importance while others were given less importance. The mean value for importance varies from 3.56 to 2.89.
2. The satisfaction levels were lower than the expectations for all the factors and outcomes. So, the stakeholders were, in general, not satisfied with the way ICT is being currently used in their institute. The mean value for satisfaction varies from 2.87 to 2.32.
3. There is a large gap between the importance given by the stakeholders and their satisfaction from the current usage. There is a huge mismatch between what the stakeholders want and what they are currently getting. The difference between the mean for importance and the mean for satisfaction varies from -1.12 to -0.35.
4. The following factors could be considered as barriers for ICT usage and hence the satisfaction levels are very low for them. These are "All courses at the institute to have a course website", "Availability of a National Government Policy to implement ICT in the institute", "Providing library reserves electronically", "Policy to evaluate the effectiveness of the ICT use", "Time to upload and download (speed)", "Mandatory technology courses such as MIS, HRIS for all students/teachers", "Technical support to use ICT at the institutional level", "Better collaboration among teachers using online discussion boards", "Availability of resources to promote ICT usage", "Financial readiness of the institute to support ICT" and "Improvement in understanding of complex or abstract concepts".

From Tables 2 and 3 we can see that the most important factors and outcomes of using ICT in the management education process are different for teachers and students.

Also the most important factors and outcomes of using ICT in the management education process are different for stakeholders from difference streams. The following tables show the most important factors/outcomes for stakeholders from finance, marketing, HR, biotech and systems.

Table 2: Top 15 factors/outcomes of using ICT as given by teachers (based on mean)

Factor/Outcome
Ease of availability of ICT
Upgrading teacher's ICT skills
Convenience (time and place)
Time to upload and download (speed)
Improving communication between students and teachers
Reliability (i.e. should do as expected of it) of ICT
IT and data security
Availability of specialized IT teachers
Availability of Educational software
Improving the presentation of the subject.
Ease of navigation of the course content through an ICT device
Improve overall learning.
Providing encouragement to teachers to use technology in their teaching more often.
Increase in efficiency
Increase in quality of projects

Table 3: Top 15 factors/outcomes of using ICT as given by students(based on mean)

Factor/Outcome
Time to upload and download (speed)
Ease of availability of ICT
Reliability (i.e. should do as expected of it) of ICT
Increase in quality of projects
Convenience (time and place)
Increase in efficiency
Increase in productivity
Improving the presentation of the subject.
Make the work more interesting
More focus on real-world tasks and examples.
Teacher's technical competence
Improving communication between students and teachers
IT and data security
Improve overall learning.
Providing students more opportunities to use technology in their coursework.

Table 4: Top 5 factors/outcomes of using ICT as given by finance stakeholders

Factor/Outcome
Make the work more interesting
Increase in quality of projects
Improving communication between students and teachers
Infrastructural readiness of the institute to support ICT
Increase in productivity

Table 5: Top 5 factors/outcomes of using ICT as given by marketing stakeholders

Factor/Outcome
Increase in efficiency
Improving the presentation of the subject.
Increase in quality of projects
IT and data security
Increase in productivity

Table 6: Top 5 factors/outcomes of using ICT as given by HR stakeholders

Factor/Outcome
Convenience (time and place)
Upgrading teacher's ICT skills
Improving the presentation of the subject.
Financial readiness of the institute to support ICT
Increase in efficiency

Table 7: Top 5 factors/outcomes of using ICT as given by Operations stakeholders

Factor/Outcome
Ease of learning technology.
More focus on real-world tasks and examples.
Keeping up with current developments in ICT.
Availability of Educational software
Improving communication between students and teachers

Table 8: Top 5 factors/outcomes of using ICT as given by Biotech stakeholders

Factor/Outcome
Increase in efficiency
More opportunities for practice and reinforcement.
Availability of specialized IT teachers
Increase in quality of projects
Improve overall learning.

Table 9: Top 5 factors/outcomes of using ICT as given by systems stakeholders

Factor/Outcome
Availability of specialized IT teachers
Increase in quality of projects
Improvement in understanding of complex or abstract concepts.
Reducing the cost of education
More focus on real-world tasks and examples.

There is no significant difference in the perception of stakeholders belonging to different PG specializations (HR, marketing, finance, Biotech, Operations, systems and others) for the top 10 factors (Table 10).

When the comparison was done for all the factors, the following factors showed significant difference:

"Policy to evaluate the effectiveness of the ICT use" - HR people had different opinion on this as compared to other streams. The mean importance to this factor given by HR people was 3.54 whereas all other streams had given lower value to the importance (Marketing: 2.93, finance: 3.11, Operations: 2.67, Systems: 2.50, Others:2.89, Biotech: 3.30).

"Financial readiness of the institute to support ICT" – For this factor the opinion was varied across streams, like Finance and Marketing (means: 3.46 and 3.24), HR and Biotech (means: 3.65 and 3.22), HR and Marketing (means: 3.65 and 3.24).

"Infrastructural readiness of the institute to support ICT" – Systems people had different opinion on this as compared to other streams. Systems people had given very low importance to this factor (finance: 3.48, marketing: 3.3, HR: 3.52, Operations: 3.33, Others: 3.20, systems: 2.00, Biotech: 3.19). This could be because the Systems people assume that the institute would have the required infrastructure to support ICT.

"Building awareness towards importance of Technology" and "Ease of learning technology" – Respondents not belonging to any of the HR, Marketing, finance, Biotech and Systems gave low importance as compared to all these streams.

Table 10: Significance for difference in importance given to factors/outcomes, based on PG specialization. (for top 10 factors)

Factor/Outcome		Sum of Squares	df	Mean Square	F	Sig.
UPLOAD	Between Groups	3.133	8	.392	.842	.566
	Within Groups	198.237	426	.465		
	Total	201.370	434			
EASE	Between Groups	2.470	8	.309	.677	.712
	Within Groups	194.183	426	.456		
	Total	196.653	434			
RELIABIL	Between Groups	5.332	8	.667	1.539	.141
	Within Groups	184.452	426	.433		
	Total	189.784	434			
CONVENIE	Between Groups	7.778	8	.972	1.835	.069
	Within Groups	224.597	424	.530		
	Total	232.374	432			
REDUCTIO	Between Groups	2.716	8	.340	.764	.635
	Within Groups	189.786	427	.444		
	Total	192.502	435			
QUALITY	Between Groups	4.452	8	.556	1.326	.229
	Within Groups	179.227	427	.420		
	Total	183.679	435			
PRESENTA	Between Groups	6.468	8	.809	1.607	.121
	Within Groups	214.862	427	.503		
	Total	221.330	435			
COMMUNIC	Between Groups	2.680	8	.335	.721	.673
	Within Groups	198.274	427	.464		
	Total	200.954	435			
PRODUCTI	Between Groups	2.246	8	.281	.544	.824
	Within Groups	220.514	427	.516		
	Total	222.759	435			
TEACCOMP	Between Groups	4.430	8	.554	1.182	.308
	Within Groups	199.561	426	.468		
	Total	203.991	434			

There is no significant difference in the perception of stakeholders belonging to different UG Backgrounds(Arts, Commerce, Science, Engineering, BCA, BBA/BMS, Medical, LLB, others) for the top 10 factors (Table 11). Even when comparison was done for all the factors, no significant difference was found.

Table 11: Significance in difference for importance given to factors/outcomes, based on UG background (for top 10 factors)

Factor/Outcome		Sum of Squares	Df	Mean Square	F	Sig.
UPLOAD	Between Groups	1.890	7	.270	.609	.749
	Within Groups	191.965	433	.443		
	Total	193.855	440			
EASE	Between Groups	3.053	7	.436	1.032	.408
	Within Groups	182.502	432	.422		
	Total	185.555	439			
RELIABIL	Between Groups	4.440	7	.634	1.547	.150
	Within Groups	177.176	432	.410		
	Total	181.616	439			
CONVENIE	Between Groups	1.910	7	.273	.519	.821
	Within Groups	226.687	431	.526		
	Total	228.597	438			
REDUCTIO	Between Groups	4.394	7	.628	1.480	.172
	Within Groups	184.070	434	.424		
	Total	188.464	441			
QUALITY	Between Groups	2.688	7	.384	.912	.497
	Within Groups	182.814	434	.421		
	Total	185.502	441			
PRESENTA	Between Groups	.456	7	.065	.130	.996
	Within Groups	217.428	434	.501		
	Total	217.885	441			
COMMUNIC	Between Groups	2.435	7	.348	.754	.626
	Within Groups	200.262	434	.461		
	Total	202.697	441			
PRODUCTI	Between Groups	2.719	7	.388	.766	.616
	Within Groups	219.978	434	.507		
	Total	222.697	441			
TEACCOMP	Between Groups	1.568	7	.224	.478	.851
	Within Groups	202.611	432	.469		
	Total	204.180	439			

There is a significant difference in the perception of stakeholders belonging to different PG Colleges(SIESCOMS, YMT, BVIT, DYPatil, ITM) for most of factors (Table 12).

Table 12: Significance in difference for importance given to factors/outcomes, based on PG College (for top 10 factors)

Factor/Outcome		Sum of Squares	Df	Mean Square	F	Sig.
UPLOAD	Between Groups	3.742	4	.936	2.055	.086
	Within Groups	204.381	449	.455		
	Total	208.123	453			
EASE	Between Groups	5.177	4	1.294	2.932	.021
	Within Groups	198.215	449	.441		
	Total	203.392	453			
RELIABIL	Between Groups	7.404	4	1.851	4.437	.002
	Within Groups	187.301	449	.417		
	Total	194.705	453			
CONVENIE	Between Groups	5.889	4	1.472	2.816	.025
	Within Groups	233.184	446	.523		
	Total	239.073	450			
REDUCTIO	Between Groups	4.872	4	1.218	2.844	.024
	Within Groups	192.697	450	.428		
	Total	197.569	454			
QUALITY	Between Groups	5.623	4	1.406	3.419	.009
	Within Groups	185.014	450	.411		
	Total	190.637	454			
PRESENTA	Between Groups	6.558	4	1.639	3.354	.010
	Within Groups	219.934	450	.489		
	Total	226.492	454			
COMMUNIC	Between Groups	2.421	4	.605	1.326	.259
	Within Groups	205.359	450	.456		
	Total	207.780	454			
PRODUCTI	Between Groups	6.473	4	1.618	3.261	.012
	Within Groups	223.307	450	.496		
	Total	229.780	454			
TEACCOMP	Between Groups	7.242	4	1.811	3.948	.004
	Within Groups	205.438	448	.459		
	Total	212.680	452			

It can be seen from Table 13 that for most of the factors, stakeholders from BV had the highest expectations. This could be because not much of ICT is being used in the teaching and learning process in their institute and they have high expectations from ICT.

Table 13: Mean for importance given to factors/outcomes, based on PG college where the difference was significant as given by ANNOVA

FACTOR	COLLEGE	MEAN		FACTOR	COLLEGE	MEAN		FACTOR	COLLEGE	MEAN
EASE	SIES	3.52		FINANREA	SIES	3.41		SECURITY	SIES	3.41
	YMT	3.62			YMT	3.45			YMT	3.51
	DYPatil	3.40			DYPatil	3.16			DYPatil	3.27
	ITM	3.43			ITM	3.22			ITM	3.29
	BV	3.73			BV	3.52			BV	3.56
RELIABIL	SIES	3.57		CULTREAD	SIES	3.18		ROUTINE	SIES	3.10
	YMT	3.44			YMT	3.22			YMT	3.27
	DYPatil	3.24			DYPatil	3.06			DYPatil	3.33
	ITM	3.43			ITM	2.89			ITM	3.15
	BV	3.60			BV	3.35			BV	3.44
WORKCULT	SIES	3.44		PRODUCTI	SIES	3.50		EDUSOFT	SIES	3.27
	YMT	3.37			YMT	3.36			YMT	3.59
	DYPatil	3.15			DYPatil	3.37			DYPatil	3.34
	ITM	3.20			ITM	3.23			ITM	3.20
	BV	3.37			BV	3.60			BV	3.46
TECHCOUR	SIES	3.11		POWTHINK	SIES	3.31		LEARNIT	SIES	3.17
	YMT	3.49			YMT	3.47			YMT	3.45
	DYPatil	3.36			DYPatil	3.30			DYPatil	3.35
	ITM	3.05			ITM	3.15			ITM	3.28
	BV	3.33			BV	3.63			BV	3.60
LIBRARY	SIES	3.30		GRADES	SIES	3.20		CONVENIE	SIES	3.47
	YMT	3.21			YMT	3.34			YMT	3.44
	DYPatil	3.20			DYPatil	3.36			DYPatil	3.40
	ITM	2.99			ITM	2.88			ITM	3.29
	BV	3.33			BV	3.32			BV	3.71
WEBSITE	SIES	3.20		TEACCOMP	SIES	3.33		FOCUS	SIES	3.35
	YMT	3.26			YMT	3.58			YMT	3.63
	DYPatil	3.17			DYPatil	3.44			DYPatil	3.43
	ITM	2.84			ITM	3.23			ITM	3.22
	BV	3.13			BV	3.58			BV	3.44
MISHRIS	SIES	2.92		INCLASS	SIES	3.17		MOTIVATI	SIES	3.16
	YMT	3.08			YMT	3.29			YMT	3.34
	DYPatil	2.89			DYPatil	3.18			DYPatil	3.27
	ITM	3.02			ITM	3.09			ITM	3.13
	BV	3.34			BV	3.49			BV	3.52
GOVTPOLI	SIES	2.92		SPECTIAL	SIES	3.19		REDUCTIO	SIES	3.51
	YMT	2.93			YMT	3.63			YMT	3.40
	DYPatil	2.94			DYPatil	3.48			DYPatil	3.40
	ITM	2.65			ITM	3.33			ITM	3.27
	BV	3.15			BV	3.40			BV	3.60
POLICY	SIES	3.03		ENCOURAG	SIES	3.23		QUALITY	SIES	3.48
	YMT	3.27			YMT	3.29			YMT	3.52
	DYPatil	3.03			DYPatil	3.36			DYPatil	3.45
	ITM	2.73			ITM	3.05			ITM	3.26
	BV	3.19			BV	3.48			BV	3.65
INFRAREA	SIES	3.39		AWARENES	SIES	3.09		PRESENTA	SIES	3.40
	YMT	3.47			YMT	3.45			YMT	3.58
	DYPatil	3.16			DYPatil	3.36			DYPatil	3.43
	ITM	3.20			ITM	3.06			ITM	3.22
	BV	3.56			BV	3.56			BV	3.56

Table 14: Significance for difference in satisfaction given to factors/outcomes, based on PG specialization. (for last 10 factors)

Factor/Outcome		Sum of Squares	df	Mean Square	F	Sig.
WEBSITE	Between Groups	7.808	8	.976	1.215	.288
	Within Groups	330.881	412	.803		
	Total	338.689	420			
GOVTPOLI	Between Groups	6.064	8	.758	1.048	.399
	Within Groups	297.184	411	.723		
	Total	303.248	419			
LIBRARY	Between Groups	11.547	8	1.443	1.821	.071
	Within Groups	327.296	413	.792		
	Total	338.844	421			
POLICY	Between Groups	1.321	8	.165	.240	.983
	Within Groups	284.186	413	.688		
	Total	285.507	421			
UPLOAD	Between Groups	17.501	8	2.188	2.402	.015
	Within Groups	377.052	414	.911		
	Total	394.553	422			
TECHCOUR	Between Groups	4.290	8	.536	.844	.564
	Within Groups	262.354	413	.635		
	Total	266.645	421			
TECHSUPP	Between Groups	4.095	8	.512	.709	.683
	Within Groups	296.562	411	.722		
	Total	300.657	419			
COLLABOR	Between Groups	5.777	8	.722	1.062	.389
	Within Groups	282.213	415	.680		
	Total	287.991	423			
AVAILABI	Between Groups	4.782	8	.598	.932	.490
	Within Groups	261.179	407	.642		
	Total	265.962	415			
FINANREA	Between Groups	10.452	8	1.307	1.732	.089
	Within Groups	310.750	412	.754		
	Total	321.202	420			

As can be seen in Table 14, there is no significant difference in the perception of stakeholders belonging to different PG specializations (HR, marketing, finance, Biotech, Operations, systems and others) for the last 10 factors (least satisfaction) except for "time to upload and download". When the comparison was done for all the factors, the following factors showed significant difference: "Availability of specialized IT teachers", "Use by peers", "Improving communication between students and teachers". For all these factors finance people had a different opinion than the other streams.

Table 15 shows that there is no significant difference in the perception of stakeholders belonging to different UG specializations (Arts, Commerce, Science, Engineering, BCA, BBA/BMS, Medical, LLB, others)) for the last 10 factors (least satisfaction) except for "time to upload and download". When the comparison was done for all the factors, the following factors showed significant difference: "Availability of specialized IT teachers", "IT and data security", "Building awareness towards importance of Technology". For all these factors commerce people had a different opinion than the other streams.

Table 15: Significance for difference in satisfaction given to factors/outcomes, based on UG Background (for last 10 factors)

Factor/Outcome		Sum of Squares	df	Mean Square	F	Sig.
WEBSITE	Between Groups	5.379	7	.768	.957	.463
	Within Groups	336.570	419	.803		
	Total	341.948	426			
GOVTPOLI	Between Groups	6.261	7	.894	1.224	.288
	Within Groups	304.798	417	.731		
	Total	311.059	424			
LIBRARY	Between Groups	6.695	7	.956	1.166	.321
	Within Groups	344.445	420	.820		
	Total	351.140	427			
POLICY	Between Groups	2.712	7	.387	.556	.791
	Within Groups	291.715	419	.696		
	Total	294.426	426			
UPLOAD	Between Groups	4.811	7	.687	.736	.642
	Within Groups	393.361	421	.934		
	Total	398.172	428			
TECHCOUR	Between Groups	3.540	7	.506	.797	.590
	Within Groups	266.525	420	.635		
	Total	270.065	427			
TECHSUPP	Between Groups	9.580	7	1.369	1.921	.065
	Within Groups	296.335	416	.712		
	Total	305.915	423			
COLLABOR	Between Groups	2.299	7	.328	.470	.857
	Within Groups	295.198	422	.700		
	Total	297.498	429			
AVAILABI	Between Groups	5.056	7	.722	1.133	.341
	Within Groups	264.665	415	.638		
	Total	269.721	422			
FINANREA	Between Groups	7.189	7	1.027	1.362	.220
	Within Groups	315.227	418	.754		
	Total	322.415	425			

Table 16 shows that there is significant difference in the perception of stakeholders belonging to different PG colleges (SIESCOMS, YMT, BVIT, DYPatil, ITM) for all the last 10 factors (least satisfaction).

Table 16: Significance for difference in satisfaction given to factors/outcomes, based on PG College for last 10 factors

Factor/Outcome		Sum of Squares	df	Mean Square	F	Sig.
WEBSITE	Between Groups	17.762	4	4.441	5.795	.000
	Within Groups	333.326	435	.766		
	Total	351.089	439			
GOVTPOLI	Between Groups	9.877	4	2.469	3.494	.008
	Within Groups	305.254	432	.707		
	Total	315.130	436			
LIBRARY	Between Groups	21.922	4	5.480	7.105	.000
	Within Groups	336.301	436	.771		
	Total	358.222	440			
POLICY	Between Groups	12.862	4	3.215	4.874	.001
	Within Groups	286.954	435	.660		
	Total	299.816	439			
UPLOAD	Between Groups	25.524	4	6.381	7.313	.000
	Within Groups	381.326	437	.873		
	Total	406.851	441			
TECHCOUR	Between Groups	12.140	4	3.035	4.955	.001
	Within Groups	267.062	436	.613		
	Total	279.202	440			
TECHSUPP	Between Groups	10.904	4	2.726	3.898	.004
	Within Groups	302.139	432	.699		
	Total	313.043	436			
COLLABOR	Between Groups	11.889	4	2.972	4.446	.002
	Within Groups	292.847	438	.669		
	Total	304.736	442			
AVAILABI	Between Groups	11.073	4	2.768	4.480	.001
	Within Groups	265.677	430	.618		
	Total	276.749	434			
FINANREA	Between Groups	20.217	4	5.054	7.042	.000
	Within Groups	311.505	434	.718		
	Total	331.722	438			

As can be seen from Table 17, barring a few factors/outcomes, stakeholders of BV had the lowest satisfaction and stakeholders from DYPatil had the highest satisfaction.

Table 17: Mean for satisfaction given to factors/outcomes, based on PG college where the difference was significant as given by ANNOVA.

FACTOR	COLLEGE	MEAN		FACTOR	COLLEGE	MEAN		FACTOR	COLLEGE	MEAN
WEBSITE	SIES	2.25		FINANREA	SIES	2.54		INCLASS	SIES	2.59
	YMT	2.25			YMT	2.48			YMT	2.59
	DYPatil	2.65			DYPatil	2.68			DYPatil	2.67
	ITM	2.33			ITM	2.62			ITM	2.62
	BV	1.94			BV	1.91			BV	2.22
GOVTPOLI	SIES	2.33		EASE	SIES	2.60		SPECTIAL	SIES	2.73
	YMT	2.32			YMT	2.42			YMT	2.70
	DYPatil	2.54			DYPatil	2.72			DYPatil	2.68
	ITM	2.40			ITM	2.68			ITM	2.59
	BV	1.98			BV	2.00			BV	2.15
LIBRARY	SIES	2.36		RELIABIL	SIES	2.65		ENCOURAG	SIES	2.73
	YMT	2.15			YMT	2.41			YMT	2.66
	DYPatil	2.70			DYPatil	2.59			DYPatil	2.73
	ITM	2.43			ITM	2.64			ITM	2.56
	BV	1.96			BV	2.13			BV	2.23
POLICY	SIES	2.41		WORKCULT	SIES	2.66		UPGRADE	SIES	2.65
	YMT	2.37			YMT	2.63			YMT	2.50
	DYPatil	2.64			DYPatil	2.75			DYPatil	2.69
	ITM	2.52			ITM	2.64			ITM	2.55
	BV	2.02			BV	2.25			BV	2.21
UPLOAD	SIES	2.55		OPPORTUN	SIES	2.62		ADAPTIBI	SIES	2.59
	YMT	2.45			YMT	2.62			YMT	2.63
	DYPatil	2.18			DYPatil	2.80			DYPatil	2.70
	ITM	2.76			ITM	2.63			ITM	2.59
	BV	2.00			BV	2.29			BV	2.23
TECHCOUR	SIES	2.46		CLASSROO	SIES	2.55		EDUSOFT	SIES	2.55
	YMT	2.67			YMT	2.51			YMT	2.61
	DYPatil	2.80			DYPatil	2.66			DYPatil	2.67
	ITM	2.46			ITM	2.53			ITM	2.63
	BV	2.28			BV	2.13			BV	2.10
TECHSUPP	SIES	2.44		INTRANET	SIES	2.40		NAVIGATI	SIES	2.69
	YMT	2.41			YMT	2.49			YMT	2.61
	DYPatil	2.68			DYPatil	2.62			DYPatil	2.53
	ITM	2.57			ITM	2.91			ITM	2.64
	BV	2.13			BV	2.07			BV	2.09
COLLABOR	SIES	2.48		INFRAREA	SIES	2.48		CONVENIE	SIES	2.69
	YMT	2.40			YMT	2.58			YMT	2.48
	DYPatil	2.73			DYPatil	2.64			DYPatil	2.67
	ITM	2.55			ITM	2.68			ITM	2.71
	BV	2.15			BV	2.15			BV	2.31
AVAILABI	SIES	2.52		CULTREAD	SIES	2.62		COMMUNIC	SIES	2.61
	YMT	2.42			YMT	2.44			YMT	2.54
	DYPatil	2.64			DYPatil	2.68			DYPatil	2.87
	ITM	2.60			ITM	2.57			ITM	2.80
	BV	2.09			BV	2.02			BV	2.31

Table 17 (continued)

FACTOR	COLLEGE	MEAN		FACTOR	COLLEGE	MEAN
UNDERSTA	SIES	2.50		ACTLEARN	SIES	2.67
	YMT	2.47			YMT	2.76
	DYPatil	2.72			DYPatil	2.95
	ITM	2.47			ITM	2.80
	BV	2.25			BV	2.48
PRACTICA	SIES	2.62		INTEREST	SIES	2.73
	YMT	2.51			YMT	2.81
	DYPatil	2.79			DYPatil	2.96
	ITM	2.54			ITM	2.77
	BV	2.27			BV	2.34
LEARNING	SIES	2.70		PRESENTA	SIES	2.84
	YMT	2.66			YMT	3.01
	DYPatil	2.96			DYPatil	3.00
	ITM	2.63			ITM	2.83
	BV	2.40			BV	2.60
FOCUS	SIES	2.69		POWTHINK	SIES	2.63
	YMT	2.67			YMT	2.79
	DYPatil	2.96			DYPatil	2.84
	ITM	2.56			ITM	2.75
	BV	2.33			BV	2.40
CONTROL	SIES	2.68		AWARENES	SIES	2.82
	YMT	2.54			YMT	2.59
	DYPatil	2.69			DYPatil	2.73
	ITM	2.61			ITM	2.65
	BV	2.23			BV	2.21
MOTIVATI	SIES	2.63		SECURITY	SIES	2.76
	YMT	2.65			YMT	2.54
	DYPatil	2.83			DYPatil	2.66
	ITM	2.54			ITM	2.79
	BV	2.35			BV	2.23
PRODUCTI	SIES	2.76		ROUTINE	SIES	2.85
	YMT	2.49			YMT	2.68
	DYPatil	2.86			DYPatil	2.93
	ITM	2.74			ITM	2.69
	BV	2.46			BV	2.46
QUALITY	SIES	2.73		CURRDEVE	SIES	2.59
	YMT	2.56			YMT	2.51
	DYPatil	2.95			DYPatil	2.62
	ITM	2.66			ITM	2.56
	BV	2.48			BV	2.17
GROLEARN	SIES	2.69				
	YMT	2.64				
	DYPatil	2.99				
	ITM	2.77				
	BV	2.43				

CONCLUSIONS

The stakeholders were, in general, not satisfied with the way ICT is currently being used in their institute. There is a large gap between satisfaction and expectation for some of the factors and outcomes. For ICT to be successfully used by the stakeholders of a management institute, the focus of implementers should be more on the factors and outcomes which are considered to be the most important, or where the satisfaction level is the least or else where the gap between the expectations and satisfaction is large. When the stakeholders get what they expect from technology, they would be more enthusiastic about using it. Focus of implementers should be such that the barriers identified in the paper are removed, so as to encourage the stakeholders to use more of ICT in their teaching and learning process.

Also, for stakeholders belonging to different fields, different factors are important. Thus, the implementers need to take care of the perception of stakeholders from different streams and give them what they expect accordingly.

There is not much dependency of the importance of ICT usage and satisfaction from ICT usage on the PG specialization and UG backgrounds. Hence null hypothesis for both of them are accepted.

There is a lot of dependency of the importance of ICT usage and satisfaction from ICT usage on the college. Thus, null hypothesis does not hold. The management of the colleges, where the satisfaction from ICT usage has come out to be the least, need to work on improving the ICT usage in their teaching and learning process.

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