AN INVESTIGATION INTO THE INTEGRATION OF COMPUTER-TECHNOLOGY IN HIGHER EDUCATION: A COMPARATIVE STUDY OF PUBLIC AND PRIVATE SECTOR UNIVERSITIES IN PAKISTAN

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Abstract

This research aims at discovering the extent of Integration of computer skills in teaching various subjects including non computed subjects as well. It also gauges computer literacy level and the increase in efficiency of delivering lectures in class room. An observation is also made to explore the ways and means by which the faculty is updated, trained and guided for maximum utilization and incorporation of computer technology in their teaching processes. This research frame work is constructed on certain models but certain modifications have been made according to the requirement: the Technology Acceptance Model; the IT Diffusion Process Model; and the Theory of Reasoned Action to inquire about the factors contributing in creating interest and ease of use of this technology. Approximately 200 questionnaires will be randomly distributed to five public sector and five private universities across different departments and levels of teachers including lecturers, assistant professors and professors. This study elucidates the influence of availability, perceived ease of use, adoption and usage of computer technology, training and guidance in its application in various subjects and perceived social pressure on the efficiency and competence of teacher in delivering lecture.

Introduction

In our Modern Age, the advent of Information Technology has made available various teaching tools. The computer, being the most crucial of IT resources, has now been extensively used by teachers at all levels. Besides expanding students' vision, it has also broadened the scope of teaching by moving it away from traditional class-room, consequently making it more or less like a science laboratory.

In a developing country like Pakistan, use of ICT in education sector is not so developed and wide spread. In order to bring Pakistani education system at par with international standards, a strong need exists to expand and integrate use of this technology in education sector. For more convenient and innovative methods of teaching, teachers are required to incorporate computer technology with pedagogical ways.

Literature Review

Various aspects of integration of computer technology in education sector have been explored by many researchers. Waiman Cheung and Wayne Huang (2005) have assessed Internet usage by university students, with a sample size of 328 second and third year students. Variables like organizational factors, individual factors, perceptions, and attitude towards Internet usage and its impact were measured through factors like organizational support, IT support, Internet skills, perceived usefulness, enjoyment, frequency, intensity, variety in use and tools. The data show a positive correlation between the following variables, like Internet usage and skill, conventional learning and enjoyment, constructive learning and job prospects, organizational support and conventional learning. The authors concluded that Internet usage may have positive impact on students' learning and job prospects in practice. They have also provided justification for investment in Internet technology based on organizational factors, personal factors, individual perceptions, and attitude towards Internet use, and have suggested that certain measurements be implemented by universities to effectively increase Internet use.

Garland and Noyes (2004) measured the effects of mandatory and optional use of educational packages on student learning. They concluded that students whose use was mandatory rated learning packages more useful than did those for whom use was optional. They considered lack of instructions and student apathy as the basic reasons for non-use.

Brett and Nagra (2005) addressed the mismatch between approaches to learning and the way universities make computers available to learners. Based on a positive correlation between provision of suitable environment and collaborative learning and between environment and students' attitude towards using computer, they concluded that collaborative working might be fostered through provision of a supportive environment and an emphasis on a greater alignment between provision of suitable learning environments and effective learning methods.

Kirkwood (2007) conducted an interview study that investigated why and how independent learners use web based resources while undertaking their normal undergraduate coursework, exploring not only the academic contexts, but also any relevant personal, domestic, and employment-related circumstances. A sample of adult undergraduate students (second-level course modules) was drawn for interviews. Participants' use of the Internet reflected their own particular circumstances, subject to a number of different factors. The author provides certain implications for those designing courses involving the use of ICT. Web resources can contribute to students' development as self-directed learners but only when the resources form an integral and valued part of course and necessary information literacy skills have been explicitly introduced and supported.

Dorothy Williams and co-authors (2000) have examined Scottish teachers' current use, perceptions of needs, and factors influencing the uptake of ICT with a sample of 352 primary and 329 secondary school teachers. They used variables such as use of ICT, competence of teachers, their own needs and priorities for further development, and the factors that encourage or hinder the take-up of ICT in classroom, in teachers' own professional development and in the management and administration of teaching. The study showed 'teachers at the early stages of ICT development with the following results: they realized the need of training and were highly motivated and interested in developing their skills, but training alone was unlikely to be effective. 'A more holistic approach was deemed required, comprising appropriate training (appropriate in terms of skills, knowledge, relevance to educational goals and priorities, and delivery); ready access to ICT resources; and ongoing support and advice to encourage progression beyond any formal training. Provision of a localized, supportive environment was realized as important as any major national initiative.

This study surveyed the frequency and intensity of use of ICT for routine classroom teaching by non-computed teachers (teachers who do not specialize in computer science). Along with the attitude of teachers, the attitude of management has also been studied for the provision of this facility across public and private sector universities. This study surveyed same issues already discussed in literature review but in a different country (i.e., Pakistan)

Objectives

The objectives of this study were:

- To inspect current use of ICT for teaching purposes in public and private universities.
- To know the extent of computer competence in university teachers across diverse departments.
- To determine if any correlation exists between factors like attitude competence and organizational behavior, which encourage or discourage the use of ICT at university level.
- To discover the deficiencies which hinder the broader up take of computer technology for variety of tasks.
- To propose ways and means to improve the integration of ICT in education sector.

Methodology

The survey questionnaire was adapted from the validated construct of previous relevant studies. Teachers were asked to indicate the extent of their agreement or disagreement with the statements on the questionnaire on a five-point scale ranging from strongly agree (5) to strongly disagree (1). In this research independent variables are categorized as organizational behavior, computer competence, attitude towards computer usefulness, frequency and intensity of use. Cronbach's alpha coefficient based internal consistency procedure has been used which establishes inter item reliability among 20 items. The Organizational Behavior construct consisted of six statements which were derived from previous research on assessment of organizational support in Internet usage from the students' perspective (Waiman & Wayne, 2005), but adapted for the assessment of computer use at university level with alpha 0.852. The competence of teachers in computer usage is measured by six statements adapted from previously validated constructs used to measure student's competence in Internet (Waiman & Wayne, 2005) with an alpha of 0.918. The attitude of an individual assesses the extent of effectiveness and efficiency of the computer; therefore, this construct was adapted from authentic constructs in previous studies which were designed to assess attitude towards Internet usage (Waiman & Wayne, 2005) with the following eight statements with alpha 0.891. Internal consistency reliability of the measures used in this study was considered good for further statistical analyses (Sekaran, 2003). The frequency of use construct shows the frequency of the use of computer for various purposes i.e. in class room, for professional development, personal use, and for administrative purposes, as adapted from an authentic study done on Current use of ICT by teachers (Dorothy et al., 2000). Intensity of use represents the time allocated to computer use whenever used (Dorothy et al., 2000). The variable helps us understand teachers' attitude towards use of computer in daily life.

A research questionnaire was randomly distributed to 200 university teachers across different departments in public and private universities. A response rate of 75% percent was obtained from 150 completed and returned questionnaires. Response rate from government institutions is 44% whereas from semi-government18% and private institutions it was 18%.

Data Analysis and Discussion

The data colleted give us the ratio of male and female i.e. male 53% and female 44%. A majority of respondents (36%) belonged to age group 26–30 years. Whereas a majority of the respondents were MPhil and 61% lecturers completed questionnaires, mostly respondents were permanent (65%) and 44% were government employees, the majority having less than 3 years experience of

computer usage. The demographic features of respondent groups with the majority of responses are mentioned below:

Table 1: Demographic features

Gender		**Age Group**		**Education**		**Designation**	
Male	Female	26–30 years	31–35 years	M.Phil	Master	Lecturer	Assistant Professor
53.33%	44.67%	36%	21%	34%	28%	61%	26%

Employment		**Organization**			**Experience**	
Permanent	Contractual	Govt.	Semi-govt.	Private	Less than 3 years	3–5 years
65%	26%	44%	18%	18%	28.9%	26.8%

Descriptive statistics are shown in Table 2. A greater means value indicates a higher level of measured construct. The data gathered were further analyzed using the Bivariate correlation test. A linear association of variables has been measured by computing Pearson's correlation coefficient which measures how variables or rank orders are related.

Table 2: Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Attitude	145	1.50	5.00	4.3293	.62114
Competence	147	1.00	5.00	3.8764	.83244
Org.behaviour	145	1.00	5.00	3.7655	.78062
Usage	134	1.00	6.00	4.5765	1.15615

Table 3: Bivariate correlation analysis

Correlations

		Attitude	Competence	Org.Behaviour	Usage
Attitude	Pearson	1		.	. *
	Sig. (2-				
	N	14			
Competence	Pearson	.44 *	1	. *	
	Sig. (2-	.00		.	
	N	14	14		
Org .behavior	Pearson	.50 *	.39 *	1	
	Sig. (2-	.00	.00		.
	N	14	14	14	
Usage	Pearson	.32 *	.42 *	.45 *	1
	Sig. (2-	.00	.00	.00	
	N	13	13	13	13

** Correlation is significant at the 0.01 level (2-

As shown in Table 3, organizational behavior correlates significantly with attitude of individuals. Provision of PC, Internet, specialized instruction, computer training and supportive environment are strongly associated with perceptions about use of the computer as effective, productive, and beneficial in teaching process. Therefore the study shows that a supportive organizational environment affects the attitude of individuals in a positive way.

Attitude is also positively correlated with competence, which shows that if teachers are skillful in integrating computers with their subject matter then this will develop a positive perception of computer usage in them. Better computer skills generate positive perception and attitude towards computer. Therefore Organizational Behavior also correlated positively with computer competence, which means that if proper training, computer and Internet access, computer assistance, and specialized instructions are made available to teachers, this will have a high probability of enhancing competence in teachers.

Figure 1 shows that a higher percentage of respondents in private institutions (80%) reported well-equipped computer labs, in contrast to those in public sector universities (43%).

Figure 2 shows that the daily use of computer in class in private organizations is greater than in government organizations, and overall use of computer for academic purposes is greater in private organizations than government organizations. If we consider uses of computer for various tasks, then the use in

private organization is greater than in governmental organization. The study shows that the computer is more intensively used for academic purposes by teachers of private institutions, as illustrated by Figure 3, and as routine teaching workload is greater in governmental organizations illustrated by Figure 4.

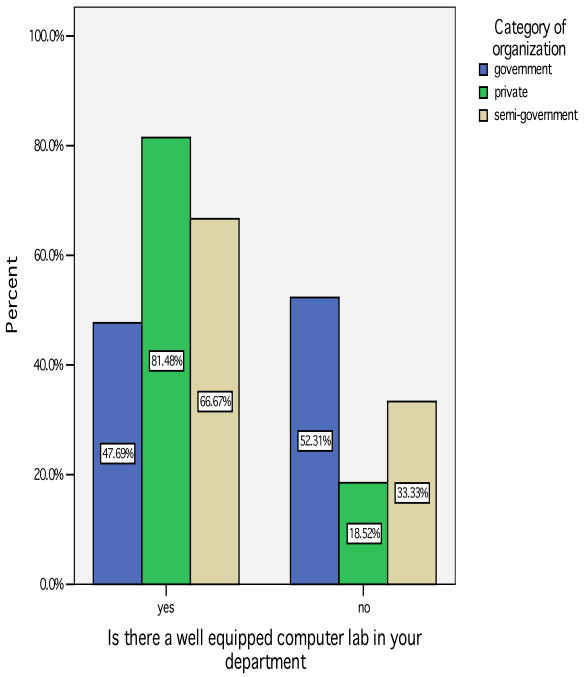

Figure 1

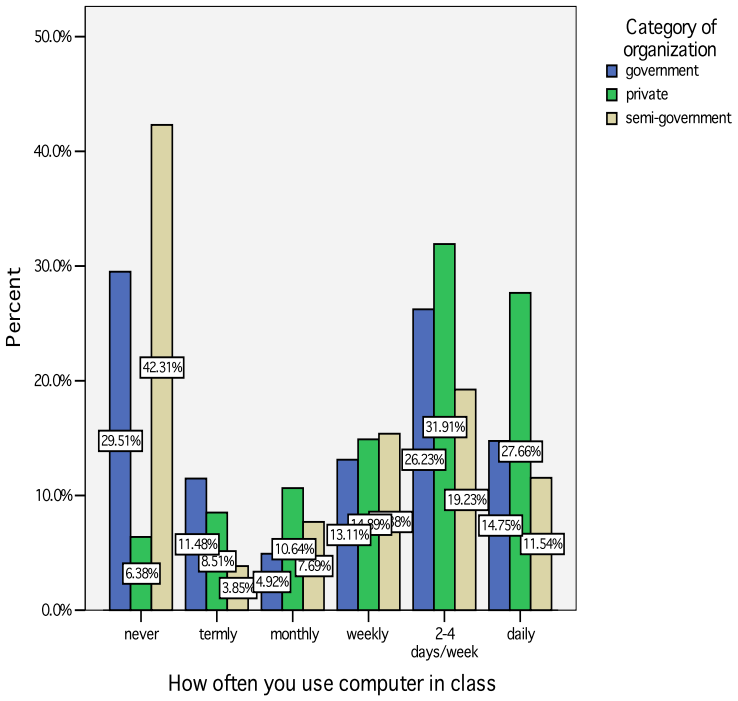

Figure 2

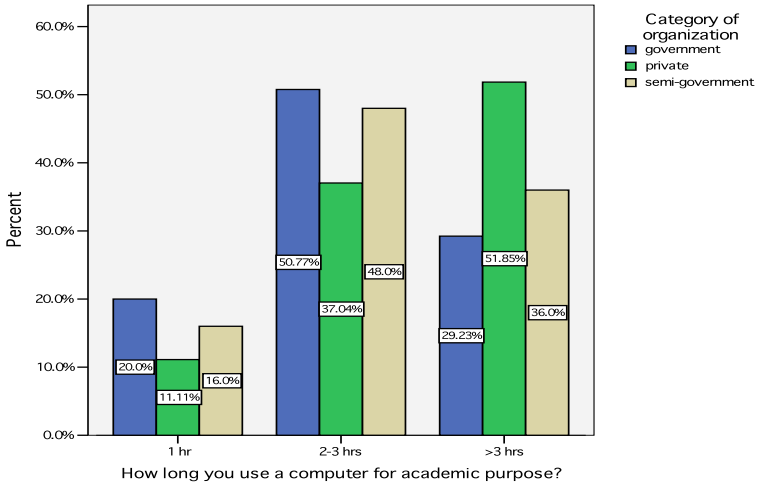

Figure 3

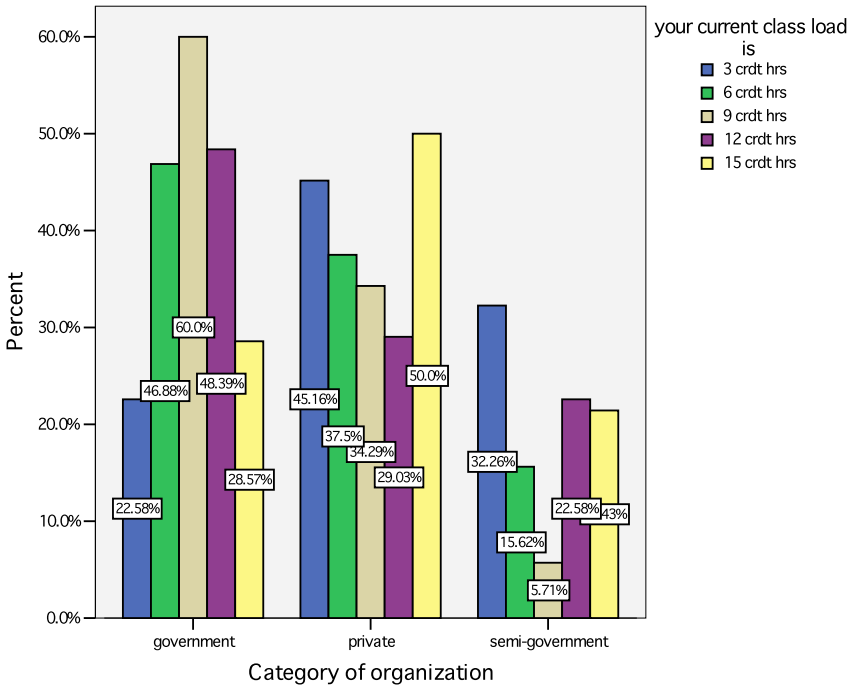

Figure 4

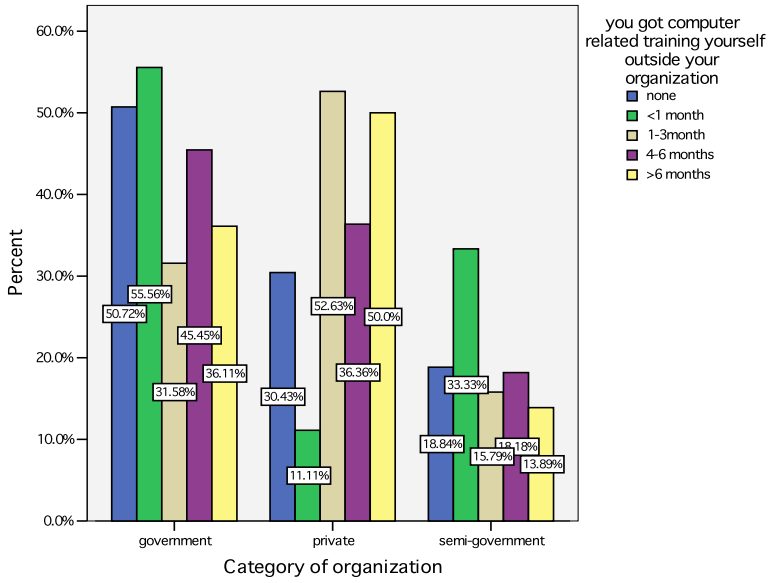

Figure 5

Figure 5 shows that teachers related to private organizations are having more training in computers as compared to government and semi-government organizations. The ratio of teachers with no training at all is 50.72% in

government institutes whereas it is 30% in private universities. In private organisations 50% of teachers were trained for over 6 months while only 36% teachers were trained for over 6 months in governmental institutions. These findings indicate that in private institutions the ratio of trained teachers is higher as compared to government institutions. But this training is not given through their organizations; rather, teachers got training on their own accord.

This research has shown that there is no proper mechanism for the enhancement of computer related knowledge in teachers. Most of them in the public sector rely on their colleagues, lab technicians, friends, and family members to keep them up to date with current advancements in the field of computer science as illustrated by Figure 6. A complete absence of training by universities seems to exist in government and semi-government universities, whereas 7.55% teachers in private organizations have shown their reliance on training courses by their universities.

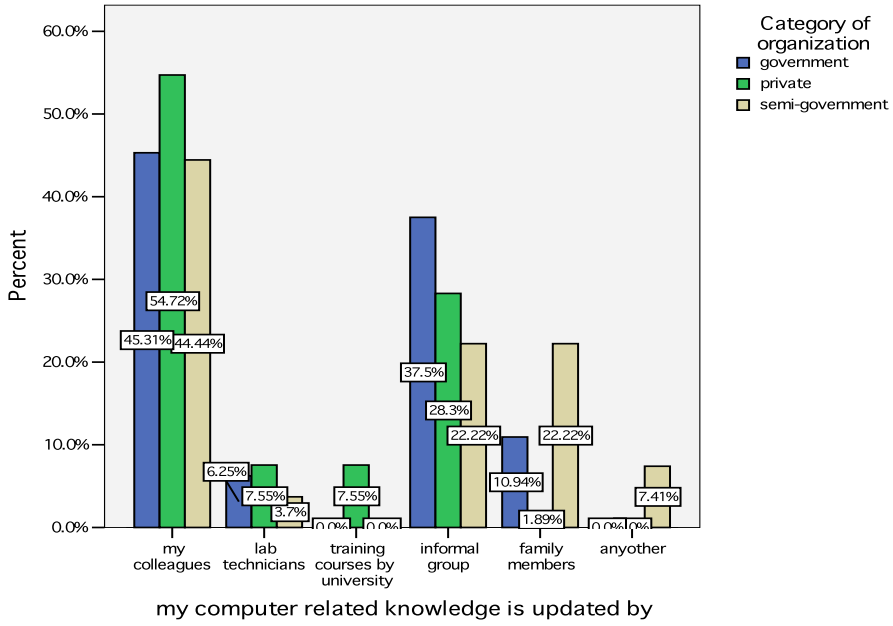

Figure 6

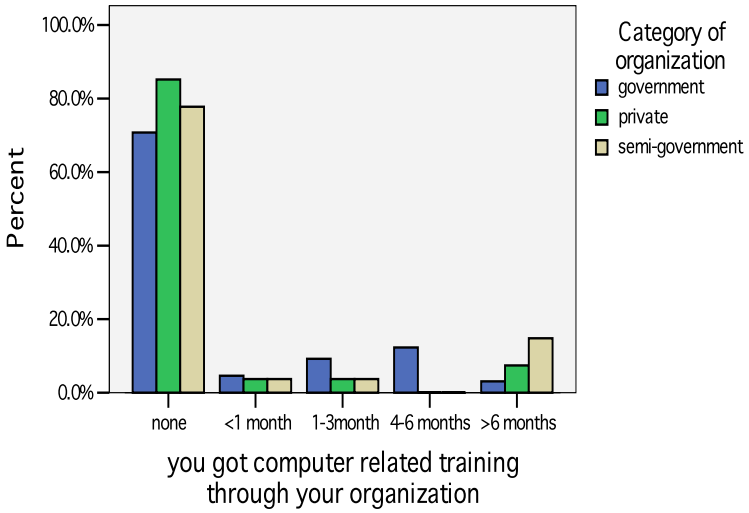

Figure 7

The construct hindrance in broader use of ICT, adapted from previous research on use of ICT by teachers (Dorothy et al., 2000) but adapted to measure ICT in Pakistani setting also indicates the problems and challenges that need to be overcome if ICT is to be used more successfully by teachers.

Table 4 shows the factors that are considered by teachers as obstacles using computers.

In using the word processor, lack of skill (28%) and lack of time (33%) are the most important reasons. The major problem to the use of spread sheet is lack of skill (almost 50%). The use of PowerPoint is hindered by lack of time (35%) and lack of skill (30%). For Internet and e-mail major obstacles are lack of access (30%) and lack of time (35%). Video-conferencing is not available in 50% and not accessible in 15% of the institutions whereas educational software packages are not used because of non availability (27%) and lack of skill (23%).

Table 4: Factors hindering the broader use of ICT

	Lack of skill	Lack of time	Lack of Access	Non-Availability
Word processor	27%	33%	16%	5.41%
Spread sheet	49%	17%		
PowerPoint	30%	35%	11%	6%
Internet & e-mail	15%	30%	35%	16%
Video-conferencing	14.41%	10.17%	13%	50%
Educational software packages	22%	12%	11%	28%

Future Implications

The data in Table 4 clearly indicate that there is a considerable lack of training in computer science and there is no proper mechanism for upgrading computer knowledge for university faculty members, especially faculty from departments outside of computer science.

Availability and access of computer technology needs to be ensured. By the end of the questionnaire a question was asked "do you intend to continue the use of computers for delivering lectures and professional growth?" Almost 95% of the respondents agreed to continue the use of computer. In response to the question regarding suggestions for further development with regard to integration of computer technology within the teaching-learning process, most of the respondents emphasized:

- The need for computer training courses for teachers by their universities.
- Provision of PCs for each faculty member
- Separate computer labs for every department
- Multimedia in every class
- Technical assistance
- Availability of ICT resources
- Establishment of a culture promoting ICT use

Conclusions

This study was designed to measure the application of ICT (attitude towards ICT, competence and current use, hindrances and future needs) at the university level both in the public and private sector. Results indicated that teachers in this sample did not have enough training to successfully integrate computer technology into the teaching-learning process. The teachers who are computer literate have done training courses on their own accord. Training was not provided by university. So, in order to make the utmost use of ICT in a proficient manner, attending computer training courses must be mandatory for faculty members and be arranged by the university administration across different departments (non-computed as well).

There is deficiency of a proper mechanism or system to update and enhance teachers' knowledge about advancements in computer technology. Technical assistance is lacking to support teachers in integrating ICT with their subject matter.

Training and technical support alone can not fulfill the purpose; a more holistic approach towards this issue is needed. Beyond formal computer training, provision

of ample ICT resources like well-equipped computer labs in all departments, Internet access, consistent support and development of technology based culture in the universities are necessary steps to make teachers rate ICT imperative for the accomplishment of their professional objectives.

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