Effect of Demographic Diversity on Teachers' Competencies Related to the Use of Educational Technology at Higher Level

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Abstract

The research was based on the assessment of difference in teacher's competencies related to Educational technology on the basis of Gender, Sector, Department, Qualification and Experience. The research was based on the comparative – descriptive style of study. All the teachers (11092) serving in the universities of Islamabad were considered as the population of research. Stratified random sampling technique was used to select a sample of 162 respondents. Data was collected by using an adopted scale (Educational Technology Standard Scale). T-test and ANOVA were used for analysis of data. Private sector was found better in use of Educational Technology while teachers of 55 and above age were also better in use of educational technology. However no significant difference was found on the basis of gender, department, qualification and experience. It is recommended that web based courses, computer skills and collaborative approach may be used for the training of the teachers on continuous basis.

Key words: *Teacher's Competency, Educational Technology.*

Introduction

With the advent of the 21st century, literacy citizens are increasingly looking to use computer technologies to access and use information. It is important to understand how to manage your electronic information through expanding resources and formats. In order to fully prepare to play an effective role in a technology-based society, teachers must not only master basic computer skills, but also must skillfully apply various technological means to solve problems, make wise decisions, and create new knowledge and professional development for students (Johnson, 1998).

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A teacher's technical competence is a set of technical standards that determine the ability to use computer related technologies for the purpose of teaching in classroom. Competencies comprise of computer-related skills, including elementary level technical operations, the use of personal and professional technical tools, social, moral and human issues in teaching. Each area contains a subsection of specific skills; these are all in the order from simple to complex to held developing and growing mastery of skills. The first is basic skills - such as managing electronic files, using computerized databases and spreadsheets, sending and receiving emails and using graphics to create documents. These skills are requirements for more progressive skills which include accessing online resources, creating desktop publishing documents, developing multimedia presentations, and selecting and customizing educational software to meet student needs, using electronic tools to simplify record keeping and other administrative procedures, and to share correctly Intellectual Property Agreement (Pope & Howard, 2002). In the 1990s, the use of technologies such as multimedia computers, DVDs, CD-ROMs, projectors and the Internet in educational settings was lower than expected today (Monroe & Tolman, 2004). Many of the exciting IT applications in educational setup validate that teaching models based on new technologies can significantly increase educational results. As a result, many people are asking how to expand the decentralized, successful "Innovative Island" teaching techniques that have given universal change to the ability to improve education by standard educational practice. Technology gives guidance for further implementation of the curriculum objectives, and in-depth embedded curriculum-related teaching process (Recesso, 2002).

This study was conducted to achieve following objectives;

1. To assess the difference of teachers' competencies related to the use of educational technology on the basis of gender.

2. To assess the difference of teachers' competencies related to the use of educational technology on the basis of Sector.
3. To assess the difference of teachers' competencies related to the use of educational technology on the basis of age.
4. To assess the difference of teachers' competencies related to the use of educational technology on the basis of department.
5. To assess the difference of teachers' competencies related to the use of educational technology on the basis of qualification.
6. To assess the difference of teachers' competencies related to the use of educational technology on the basis of experience.

Research Hypothesis

1. There is no difference of teachers' competencies related to the use of educational technology on the basis of gender.
2. There is no difference of teachers' competencies related to the use of educational technology on the basis of Sector.
3. There is no difference of teachers' competencies related to the use of educational technology on the basis of age.
4. There is no difference of teachers' competencies related to the use of educational technology on the basis of department.
5. There is no difference of teachers' competencies related to the use of educational technology on the basis of qualification.
6. There is no difference of teachers' competencies related to the use of educational technology on the basis of experience.

Effective incorporation of technology into the process of teaching-learning has become the focus of many educators as a result of the role of technology in the development of society as a whole and, in particular, in the development of the education sector. The purpose of the present study was to identify the effects of demographic variables on competencies and technical roles of teachers who could use technology in education at higher level. The study tries to catch the attention of teachers and educational administration to keep up-to-date with their information and communication technology requirements. Results of the study will help educationists to improve their technological skills by understanding the effects of demographics.

Review of Literature

In determining the success of classroom technology the most important factor is teacher who is familiar with computers and basic emerging technology. There are many teachers who enter in the teaching profession before the breakthrough of modern computer technology, played such a universal role in society with little or no special computer training. Even those teachers with basic computer knowledge are less likely to be familiar with all tools and their use that technology can provide, from spreadsheets to digital graphics to teaching software (Pope & Howard, 2002). Technology enables students to achieve their goals more easily, not only through the presence of computers and software, but also by consciously redesigning the learning context so that students' participation in online communities, social networks, web conferencing and interactive problem solving is easy opportunities for collaboration, communication and active learning (Leamnson, 2001). Technology can be integrated with the use of networking and other computer-based programs to enhance creativity of students by including a variety of media such as videos, digital photography, media player, audio and use of spreadsheets. Therefore, the effective integration of teaching techniques can be considered to improve the teaching and learning process and results (Oliver & Omari, 1999).

There is no substantial and expanded professional development in the teaching and learning of innovative models of teaching technology that make inexpensive and sustainable, and many educators will not use the full potential of these devices. The "second generation" of educational technology does not take the computer as magic, but instead makes the inaccuracy of automating it as its primary purpose. The computer is envisioned to authorize the use of a "fire-fighting hose" to "inject information from the Internet" into the learner's mind by "teaching by telling" and "listening through learning". However, even without educational technology, the classroom has been submerged in the data and overcrowded curriculum. Even with multimedia, adding more information may worsen rather than improve the educational environment if not used properly. Professional development needs are more complex than educators' technical literacy. The problem is to build teachers' knowledge and skills in other types of teaching and content. If almost all of the resources invested in hardware are not available, then the increase in personnel capacity requires a lot of money. (Akbaba, 2006). The literature points out that educational strategies based on new technologies can improve at least four educational outcomes. Some benefits are easy to communicate with the community; others are difficult, but they together form evidence that can convince most people. The following is a list of the four types of improvements, from the simplest to the most difficult to prove the order.

Increased Learner Motivation:

Pupils are thrilled to be open to new learning experiences that may go outside of information assimilation and teaching. Guided explorations, project co-operation, and mentoring all generate more motivation for learners to show through indicators that are easy to observe, such as improved rate of attendance, full concentration, and longer task time. All of this is not only related to increased educational performance, but also in stark contrast to the attitudes of parents (Johnson, 1998). Recorded into the community, students are concerned about what they are learning and trying to achieve complex goals is not difficult, because the prevalence of video players and video cameras. Student-generated videos show learner interest which is attractive to parents and other stakeholders, who may not fully understand what is happening in the classroom, but whose behavior differs from their own memory, And may lead to better learning outcomes. In many cases, educators rarely take advantage of this simple approach to dialogue with the community about teaching improvement (Schank & Jona, 1991).

Advanced topics mastered:

In the Twenty first century, as a professional and informed citizen will require complex knowledge that is described in national curriculum standards. Information technology can help students not only learn difficult concepts, but also learn how to learn skills to keep their ability to flow in a rapidly developing economy. The taxpayers are impressed by the fact that technology-based teaching strategies can teach complex ideas that are not part of a regular course, more complex than the current standardized test program, and more difficult than they have taught (Johnson, 1998).

Students acting as experts do:

The development of learners' skill to use problem-solving processes similar to those of experts is challenging, but provides strong evidence that students are gaining the skills they need to succeed in the 21st century (Schank & Jona, 1991). One of the most striking features of the classroom based on the new teaching model is that learners behave like scientists, mathematicians, designers, or other types of expert problem-solver teams. Students' activities in these learning environments reflect the increasing complexity of the working environment in which information tools are increasingly used to analyze, interpret, create, and express themselves (Johnson, 1998).

Better outcomes on standardized tests:

The most demanding type of evidence that provides the superiority of new, technology-based instructional models is the community's first requirement: the traditional measure of achievement measure is higher. Standardized tests are designed to assess only the narrow range of knowledge. One of the main challenges of educational assessment is to develop methods for measuring broader skills rather than pen and paper, multiple choice tests, without distracting educators from complex, time-consuming and potentially unreliable performance evaluations. Studies have shown that when the implementation of technology-based education innovation, the results of students on the traditional achievement test, but this will not happen immediately, because teachers and learners must first master these new pedagogy model. In order to be successful in system reform, educators must prepare for the community, as test scores do not rise immediately, while other less amenable supplementary types of improvements are better short-term improvements (Schank & Jona, 1991).

As technology spreads in almost all fields and almost all areas of human endeavor, technical skills have become critical in all thematic areas, as computers are now a universal tool for obtaining and disseminating information in all fields. The process of learning becomes more active rather than passive, because students control their own learning and they consider and interact with the content on the computer screen. Because computers can fundamentally expand information access and communications, they can benefit by increasing their participation in the learning process. Teachers must be skilled in using various educational software technologies. Regardless of grades or disciplines, technology can support teachers to take part in many professional activities, first inspiring interest in the classroom, but also can simplify their management responsibilities, improve personal productivity and encourage professional growth (Wepner & Tao, 2002).

Research Methodology

The research was based on descriptive style. It mainly involved the survey related to the current issue of daily classroom situation. Further it included a comparative analysis on the basis of demographic variables. The population of the research was based on all the teachers serving at HEC recognized universities of Islamabad. In 13 public and 04 private sector universities 11092 faculty members were serving in total. The record showed that 9421 teachers were from public sector while 1671 teachers were from private sector. Stratified sampling technique was used to draw the sample from the population. Although the study was based on comparative approach and it involved multiple variations in the characteristics of sample (gender, sector, age, department, qualification, experience). However the sample was selected by considering public and private sectors as two major strata's. 162 faculty members contributed in the data collection process. 99 respondents were from public and 63 respondents were from private sector. The researcher used 'Educational Technology Standard Scale (ETSS) developed by Ahmet Naci Coklar and Hatice Ferhan Odabasi (2009) under International Society for technology in Education (ISTE). The scale was based on 41 items in total and it was based on six following sub sections:

a) Technology operations and concepts (F1)
b) Planning and Designing learning Experiences (F2)
c) Assessment and Evaluation (F3)
d) Productivity and Professional Practice (F4)
e) Social, Ethical, Legal and Human issues (F5)
f) Planning of Teaching according to Individual Differences (F6)

Data was collected with the help of personal visits of the researcher. Analysis was carried out through t-test and ANOVA

Results

Table No. 1. Cronbach's Alpha Reliability of Educational Technology Standards Scale (ETSS)

Scale	**Items**	**Cronbach's Alpha Reliability**
ETSS	41	.92

Table No. 1 shows the Cronbach's Alpha reliability of the 'Educational Technology Standards Scale' used in the research. It shows that the calculated reliability was .92. that represents the good level of reliability of the scale.

Table No. 2. Inter- Section correlation between sub sections of Educational Technology Standards Scale

	F1	**F2**	**F3**	**F4**	**F5**	**F6**	**Teachers' Competencies**
F1	1	.742**	.573**	.146	.045	.028	.746**
F2	.742**	1	.689**	.159*	.039	-.015	.790**
F3	.573**	.689**	1	.262**	.135	.042	.769**
F4	.146	.159*	.262**	1	.766**	.660**	.646**
F5	.045	.039	.135	.766**	1	.716**	.508**
F6	.028	-.015	.042	.660**	.716**	1	.419**
Teachers' Competencies	.746**	.790**	.769**	.646**	.508**	.419**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table No. 2 shows the inter relationship between the factors/sections of the ETSS. The table indicates that all the sub sections of the scale were statistically significantly correlated with each other. The highest correlation (.766**) was found between 'Productivity and Professional Practice and Social, ethical, Legal and Human Issues'.

Table No. 3 Comparison of teacher's competencies on the basis of Gender

Variable	Gender	N	Mean	T	df	Sig.
Teacher's Competency	Male	57	155.79	.75	160	.45
	Female	105	153.27			

Table No. 3 shows that t value (.75) was not found significant. Thus there was no statistically significant difference found between male and female respondents related to the competency for the use of Educational Technology. So hypothesis No. 1 "There is no difference of teachers' competencies related to the use of educational technology on the basis of gender" is accepted.

Table No. 4 Comparison of teacher's competencies on the basis of Sector

Variable	Sector	N	Mean	T	df	Sig.
Teacher's Competency	Public	99	150.00	3.38	160	.00
	Private	63	160.68			

Table No. 4 shows that there was statistically significant difference (t = 3.38) found in teachers competency related to the use of Educational technology on the basis of Sector. The teacher's from private sector (Mean = 160.68) were found better. Thus hypothesis No. 2 "There is no difference of teachers' competencies related to the use of educational technology on the basis of Sector" is rejected at 0.01 level of significance.

Table No. 5 Comparison of Teacher's competencies on the basis of Age variation

Variable	Age	N	Mean	F	df	Sig.
Teacher's Competency	23 – 35	104	151.26	3.65	158	.01
	36 – 45	41	155.95			
	46 – 55	13	165.54			
	55 +	04	174.00			

Table No. 5 shows that there was statistically significant difference (F = 3.65) found in teacher's competency related to the use of Educational technology on the basis of Age. The teachers of 55 and above age were found better in application of Educational Technology Standards. Thus hypothesis No. 3 "There is no difference of teachers' competencies related to the use of educational technology on the basis of age" is rejected.

Table No. 6 Comparison of Teacher's competencies on the basis of Departments

Variable	Departments	N	Mean	F	df	Sig.
Teacher's Competency	Management Sciences	20	160.00	.95	159	.38
	Social Sciences	90	153.44			
	Other	52	153.13			

Table no. 6 shows that there was no statistically significant difference found between different departments related to the teacher's competencies. Thus hypothesis No. 4 "There is no difference of teachers' competencies related to the use of educational technology on the basis of department" is accepted.

Table No. 7 Comparison of Teacher's competencies on the basis of Qualification

Variable	Qualification	N	Mean	F	df	Sig.
Teacher's Competency	Masters	47	157.23	.62	157	.64
	M.Phil/MS	68	152.90			
	Ph.D	37	151.46			
	Post Doc	01	164.00			
	Any other	09	157.56			

Table No. 7 shows that there was statistically no significant difference found between teachers' having different qualifications. Teachers were found same in use of Educational Technology and competencies. Thus hypothesis No. 5 "There is no difference of teachers' competencies related to the use of educational technology on the basis of qualification" is accepted.

Table No. 8 Comparison of Teacher's competencies on the basis of Experience

Variable	Experience	N	Mean	F	df	Sig.
Teacher's Competency	1 – 5	57	152.77	.52	158	.66
	6 – 10	52	155.21			
	11 – 15	49	153.76			
	15 +	04	165.00			

Table No. 8 shows that there was statistically no significant (F = .52) difference found related to use of Educational Technology on the basis of experience. So the hypothesis No.6 "There is no difference of teachers' competencies related to the use of educational technology on the basis of experience" is accepted.

Discussion

Findings of the study indicated that there was no significant difference found between teacher's having different qualifications. From the findings of the study it was revealed that there was no significant difference found between male and female respondents related to the competency for the use of Educational Technology. Findings of the study were in line with the study conducted by Davis and Davis (2007) in which no statistical difference between male and female were found regarding their use of computer competencies. Findings of the present study revealed that there was significant difference found in teacher's competency related to the use of Educational technology on the basis of Age. The teachers of 55 and above age were found better in application of Educational Technology Standards. This conclusion is consistent with the findings from previous study done by Morris, Venkatesh and Ackerman (2005) where they found that technological perception among older workers are more pronounced as compare to younger workers. Table No. 4 indicates that there was significant difference found in teachers competency related to the use of Educational technology on the basis of public and private sector. The teacher's from private sector were found better as compare to teachers of public sector. Results indicated that there was no significant difference found between different departments related to the teacher's competencies. Results revealed that there was no significant difference found related to use of Educational Technology on the basis of experience.

Recommendations

1. According to present research it was proven that the teacher's from private sector were found better as compare to teachers of public sector; hence it is recommended that public university authorities may pay attention towards improving teachers competencies by arranging trainings regarding educational technologies.
2. Teachers need to provide IT training so that they become better users, and can improve student learning.
3. It is recommended that web based courses, computer skills and collaborative approach may be used for the training of the teachers on continuous basis.
4. It is recommended that universities may take initiative to evaluate teacher's use of technologies so that they can improve competencies of teaching staff.
5. Since the nature of this study is unique, the results of this study may provide guidance to future researchers in this area. This study is limited to Islamabad, but further researchers should be extended to a wider range of jurisdictions.

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