PREDICTOR OF E-LEARNING DEVELOPMENT AND USE PRACTICES IN HIGHER EDUCATION INSTITUTIONS (HEIs) OF NWFP, PAKISTAN

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ABSTRACT

One cannot predict the details of future but one can surely prepare for it. Researchers in eLearning are capitalizing on the user-perceptions as possible predictor of the user-attitudes towards the development, use, problems and prospects of eLearning in their institutions. This application is founded on the psychological fact that a human's attitude depends on his/her 'belief' or 'perceptions: meaning given by the individual' about the thing used. That is, if eLearning users perceive educational technologies favorably, they are more likely to speedily adopt digital tools than those who misperceive or under-perceive them.

This research reveals that perceptions about educational technologies are very significantly related with and predict the criterion variable of 'Problems of eLearning' but surprisingly, the 'prospects of eLearning' are very nominally associated with and predicted by the predictor.

Keywords: Perceptions; Educational Technologies; eLearning Development; Use; Problems and Prospects

INTRODUCTION

The perceptions and theories of developers and users of eLearning have been used as the predictors of development and use practices of eLearning in higher education institutions (HEIs) (Aviram & Tami, 2004). Furthermore, technology-related changes are perceived as personal rather than social challenges (Sasseville, 2004). At the broader level, educational technologies are perceived either as 'instrumental/ supplementary' or 'substantive/liberal' in higher education. If information and communication technologies (ICTs) are considered just like other technologies with no role other than their technical role, the view is instrumental. But substantive theorists suggest that ICTs can change the culture of society and their mere existence can make the difference (Macleod, 2005; Ezer, 2006).

There is need to consider human diversities "in addition to the technical matters (Walsham, 2000:105)" because if systems are not designed according to the learner perceptions, characteristics (i.e., gender, age), and context of use, problems can recur (Graff et al., 2001). Furthermore, if eLearning matches with the learning style of the learner, the benefits are higher but if otherwise, eLearning cannot contribute much (Cagiltay, Yildirim & Aksu, 2006). Aviram & Tami (2004) identify seven approaches

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(perceptions) and five attitudes (practical behavior) about the development and use of eLearning, where approaches are: administrative, curricular, didactic, organizational, systemic, cultural and ideological; while attitudes have been classified into: agnostic, conservative, moderate, radical, and extreme radical.

This research analyses data on the perceptions of students, teachers, and administrators in HEIs of NWFP, Pakistan about eLearning development and use. 'Perceptions about the educational technologies' have been used as predictor of the user-perceptions about the development, use, problems and prospects of eLearning in higher education. Correlation and histograms have been used to test the hypotheses about the 'association' of predictors and criterion variables along with regression analysis to support the relationship between predictor and criterion variables.

LITERATURE REVIEW

eLearning in HEIs

eLearning refers to any level of applying computers and related technologies in pedagogy, learning and education-management (Tinio, 2002; Young, 2003; Gray et al., 2003; Kanuka, 2007). For example, teachers and students in higher education use Internet for browsing, emailing, chatting or any other purpose and thereby learn to add new aspects to their teaching and learning – this is also eLearning. Similarly, using a computer for preparing lecture (by teacher), an assignment (by student) and typing and composing a letter in the word-editor (by staff) or doing all this virtually as do the Virtual Universities – all is included in eLearning (Sife et al., 2007).

The educational use of ICTs is diverse beginning with a simple information delivery (accessing an online library) and stretching to the modern applications of cognitive tools (Web 2.0 technologies), which belong to the family of adaptive and personalization technologies or systems to create individualized learning and teaching environments (Sirkemaa, 2001; Chan & Lee, 2007).

eLearning thus, refers to a continuum of educational technologies with Word, Excel, Access and PowerPoint as the main tools on one hand with 'No or little' impact on teaching, learning and administrative practices. On the other divide lies the virtual learning environments using web-based technologies and virtual lecture halls casting wide-spread impacts on pedagogy, learning and educational administration (Sife et al., 2007; Thompson, 2007).

Perceptions about Education-Technologies

One way to assess a user's approach to eLearning is the assessment of his/her perceptions and attitudes about the educational technologies because research is documenting individual differences of response to the development and use of eLearning in HEIs (Graff et al., 2001). The research confirms that the development and use processes of eLearning can be handled adequately if teachers' perceptions of technology integration and its impact on their instructional practice are well understood beforehand (Zhao & Bryant, 2006) because teachers' attitudes are strongly related to their successful use of new technology (Bataineh & Abdel-Rahman, 2006).

Similarly, students' involvement in the use of computers also depends on their perceived usefulness for communication and access to information (Gay et al., 2006). Researchers have grouped eLearning users, particularly teachers, into:

- ➢ **Cynics: They have negative perceptions about eLearning but strong pedagogical beliefs therefore unwilling to change;**
- ➢ **Moderates: They like ICTs and ready to change and adapt to new pedagogical practices with some guidance and training;**
- ➢ **Adaptors: These are the intellectual leaders who use eLearning for inner progress and external enhancements by continuously updating their pedagogy with latest technologies (Mehra & Mital, 2007).**

A real big concern in this regard is that the user-demographics (age, gender, nationality, learning style), also change the perceptions of an individual, for instance, female users lag behind the male users of educational technologies (Graff et al., 2001).

Likewise, Net Genres (new generation of students) have multitasking style, process information differently than their ancestors and better learn in a customizable environments where teachers are no more 'sage on the stage rather guide on the side' (Tinio, 2002; Dinevski & Kokol, 2005). Likewise, younger students have be found less motivated than the older users (Gay et al., 2006). Net Geners bring prior knowledge to the universities, which affect the manner in which students receive, analyze and use the facts and figures (DiCerbo, 2007).

Despite the fact that paradigm shifts in eLearning have transformed the perceptions of the society about new technologies (Ezziane, 2007), very limited research has been documented about the user perceptions particularly, in the developing countries (Bataineh & Abdel-Rahman, 2006). A broader grouping of the diversity of perceptions emerges into two wider divisions of theories about the nature and role of education technologies:

- ➢ **Instrumental View: It is the most commonly held belief that ICTs are a 'tool' without any inherent value rather power lies in the way it is used thus there can be a 'single-model' for universal application of technologies (Macleod, 2005; Radosevich & Kahn, 2006). Instrumental theory asserts that since education has to serve the society thus focus should be on the utility of education by enabling the students to apply their knowledge vocationally and contribute to the economy. But, this idea limits the learner to their subjects only thereby blocking their critical thinking about the broader social and communal objectives beyond their professional boundaries (Ezer, 2006).**
- ➢ **Substantive View: Substantive theorists posit that ICTs are not neutral rather determinist and unlike older technologies they have far reaching impacts on the lifestyle of the societies (Young, 2003). This group of perceptions suggests that technology has positive and negative implications for the individuals, groups, organizations and society (Macleod, 2005; Radosevich & Kahn, 2006). The substantive theory matches with the 'liberal theory' of education (Ezer, 2006), which views learning as an active, interconnected and socially collaborative experience and not simply a recollection of facts.**

Development of eLearning

The development of eLearning environment for HEIs is not automatic rather a complex and multifaceted process that involves, not only technology but also pedagogy, curriculum, institutional eReadiness, teachers' digital literacy and consistent financing, per se (Tinio, 2002).

The growth of innovative practices in eLearning has developed new skills and novel ways of using them within project teams for eLearning projects (Gray et al., 2003). However, the design and development of eLearning environments must be aligned with the "student requirements (Young, 2003)" In the context of globalization, international connectivity, instant communication via Internet and mobile technologies; the universities, all over the world, are confronting huge challenges, both external and internal (Loing, 2005).

A research from universities by Lewis & Goodison (2004), reveals that those who were running successful eLearning-initiatives, strongly perceived that the "developments needed to be driven by pedagogy, not the technology." Likewise, data on eLearning experiences in developed and developing countries provide enough evidence to understand that it is not technology (Jewels & Ford, 2006) rather human and cultural issues which can either work as critical success factors or turn into critical failure variables. For example, culture is a highly influential mediator in the present educational environments wherein pedagogical models are an integral part of the culture of every institute (Nyvang, 2006).

Use of eLearning

Given the differences of perceptions (Young, 2003) users behave differently while using the eLearning tools and techniques for teaching, learning and administrative purposes (LaCour, 2005). Moreover, the training that educators do receive does not always match with their educational needs, because the faculty is rarely involved in the decisions about technology and design of new strategies for technology-integration (Juniu, 2005; Zhao & Bryant, 2006). In developing countries, ICTs have not permeated to a great extent in HEIs due to many socio-economic and technological circumstances which hinder the successful use environment (Sife et al., 2007).

The greatest challenge in 'using' the eLearning environments is to adapt the computer-based system to differently skilled learners, for example, if it is too complex, the user will be lost, confused and frustrated but too simple or non-systematic environments can engender problems of user-motivation (Sirkemaa, 2001). Technology is disruptive by nature, which demands new investments of time, money, space, and skills (Aaron et al., 2004). Furthermore, face-to-face communication is critical for classroom social relationships and interpersonal processes, for example, eLearning have reduced support for social interaction. The emotions can be conveyed through e-mail or chatting but it cannot replace the socio-emotional interaction (Russell, 2005). Taken together, barriers in the use of eLearning gadgets can make technology use frustrating for the technologically perceptive, let alone the many teachers who may be somewhat techno-phobic (Ezziane, 2007)."

The most troublesome issue in the 'use' of eLearning applications across the HEIs of the developed and developing countries is the provision of sustained technical support by the ICT-professionals and IT-department or division because the success of an eLearning project is reportedly dependent on the skills and quality of technical support available to the end-users (Gray et al., 2003; Valcke, 2004; Valdez et al., 2004). Juniu (2005) asserts that faculty users do not only depend on ICT staff for technological support but also face pressures from the government, society and pedagogues to use technology in supporting constructive, authentic, and cooperative learning. Thus, technology training only cannot ensure better use of new tools; users also need continuous technical and human resource support across the use (Zhao & Bryant, 2006).

Problems of eLearning

Contemporary research on eLearning reveals that more than half of all ICT-projects become runways, with overshooting budgets, delayed timetables, escalation in decision making and filing to deliver their objectives (McManus & Wood-Harper, 2004:3; Venables & Tan, 2006). Similarly, though ICTs are emerging in HEIs but the pace and depth of their impact is, "as yet, rather limited (Baumeister, 2006)." Several researchers have identified the problems for the development, use and integration of ICTs into teaching, learning and educational management (see for example, Drinkwater et al., 2004; Bondarouk, 2006; Vrana, 2007; Kanuka, 2007; Sife et al., 2007; Wells, 2007):

> ➢ Inertia of behavior of people, like their resistance to changes, etc.
> ➢ Underestimation, lack of awareness and negative attitudes towards ICTs.
> ➢ Lack of systemic approach to implementation and lack of follow-up.
> ➢ High rates of system non-completion.
> ➢ Lack of user-training.
> ➢ Lack of administrative and technical end-user support.
> ➢ User dissatisfaction with new systems.
> ➢ Mismatches between technologies and the context, culture and work practices.

At the broader level, there are development and use problems, which need to be understood and handled at their time of emergence (Gray et al., 2003). Both development and use problems are independent as well as interdependent on each other (Klamma et al., 2007). For example, user participation is important at both the development and use levels of eLearning environments.

Prospects of eLearning

As elaborated across the preceding pages, new ICTs are proving something beyond the machine metaphor (Tinio, 2002). These technologies are casting unprecedented impacts on the life of individuals, groups, communities, organizations, societies and the global-village by changing not only their working patterns but also their culture – the way of life (Sasseville, 2004).

Furthermore this is not happening only in the developed countries rather across the globe due to the mass availability of ICTs devices, services, professionalism and knowledge resources (internet with online databases and knowledge resources) (Macleod, 2005).

The most leading and widely recognized and debated aspect of the contemporary ICTs is their potential to provide phenomenal opportunities for the developing countries (Sanyal, 2001; Tinio, 2002; Hvorecký et al., 2005; Sife et al., 2007). Developing states have long been suffering from certain education related problems due to the lack of resources and which seemed insurmountable before the emergence of modern eLearning tools and techniques (Haddad & Jurich, 2006).

For example, the provision of traditional education facilities (schools, colleges, universities decorated with learning services like buildings, furniture, equipments, libraries and so on) for face-to-face education (Hussain, 2007). Following digital opportunities are available to the world communities, particularly, in the countries like Pakistan.

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Grounded in the above literature review on the role of user-perceptions about eLearning, the researcher postulates (hypothesizes) that 'whatever is the belief (perceptions) of a user about the nature and role of ICTs, the same is translated into action (attitude or physical behavior) towards the development, use, problems and prospects of eLearning tools and techniques particularly, in the HEIs of NWFP, Pakistan.

Thus, 'perceptions about education technologies' determine the view and attitudes about all the aspects of eLearning: from development to use.

List of Variables (Predictor & Criterion)

Table: 1
Working Concepts (extracted variables)

|	Variable	Definition	Code
1	Perceptions about educational technologies	Views about hardware, software, networking etc., in eLearning.	PET
2	Perceptions about the development practices	Views about the approaches, methodologies and ICT professionals.	PDP
3	Perceptions about the use practices	Perceived use, ease of use and usability of eLearning in HEIs.	PUP
4	Perceptions about the problems	Problems of educational technologies, development and use of eLearning.	PRB
5	Perceptions about the prospects	Futuristic views of eLearning	PRS

Theoretical Framework
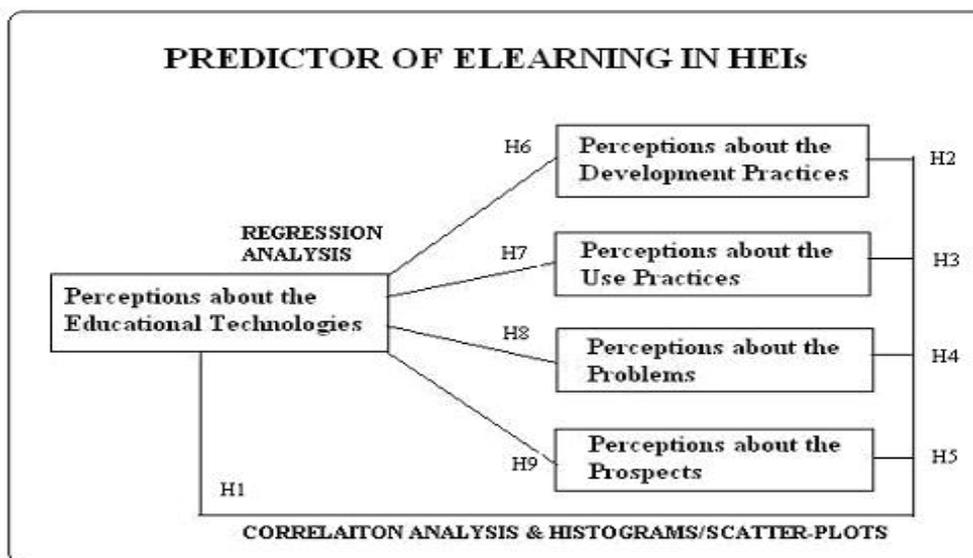
Figure: 1
Schematic Diagram of the Theoretical Framework

List of Hypotheses

- Predictor is highly correlated with all & each of the criterion variables [H_1, H_2, H_3, H_4, & H_5].
- PDP depends on the Predictor [H_6].
- PUP is determined by the Predictor [H_7].
- PRB are explained by the Predictor [H_8].
- Predictor determines the PRS [H_9].

RESEARCH DESIGN

Approach

There is a huge body of studies in developed and developing countries about the theories and practices of eLearning in HEIs both from qualitative and quantitative perspectives.

The quantitative studies, using survey instruments are multiple and thus very popular method of accessing the problem situation, for example, by Irons et al., 2002, Luck & Norton (2005), Marcella & Knox (2004), Abrami et al., (2006), Johnson et al., (2006), Radosevich & Kahn (2006), Bataineh & Abdel-Rahman (2006), Thomas & Allen (2006), Mehra & Mital (2007), Martin & Dunsworth (2007), Garcia & Qin (2007), & DiCerbo (2007) – are some from a list.

Methods

There are twenty one HEIs in NWFP, Pakistan, including universities and other educational institutes. These institutes are offering education in all the subjects of pure and social sciences as well as degrees in computer-literacy.

All the university-constituents (students, teachers, and administrators) are using computers to their respective levels of computer-proficiency.

The 'Target-Population' of the project consists of twenty (20) higher education institutions with seventeen (17) universities and three higher degree awarding institutes (HEC, 2008) in NWFP, Pakistan.

There are about 3401 teachers and 7791 administrators in the higher education of NWFP.

This paper is a part of the project and includes five variables: one predictor and four criterions 38 questions excluding demographics of the respondents.

Data was analyzed using SPSS 12.0 to create a database, produce the descriptive tables and test the hypothesis. Histograms or scatter plots have been produced to check the linearity and equality of variances between the predictor and dependent variables.

The overall reliability of Cronbash's alpha was estimated at 0.9288, with 354 cases and 38 survey items.

This value obviously exceeds the required minimum threshold for the overall Reliability-test, i.e. 0.7 (Koo, 2008).

FINDINGS OF THE STUDY

Descriptive Statistics

Table: 2
Demographic Profile of the Respondents (n=354)

City	Male/Female	Student	Teacher	Administrator	Total	%age
DIK	Male	31	38	33	102	*70.34*
	Female	26	17	0	43	*29.66*
	Sub-Total	57	55	33	145	*40.96*
Peshawar	Male	39	49	51	139	*66.5*
	Female	36	33	1	70	*33.5*
	Total	75	82	52	209	*59.04*
	Grand Total	132	137	85	354	*100*
	%age	*37.28*	*38.7*	*24.02*	*100*	

Table: 3
Description of the Research Variables

	Min	Max	Mean	Rank	Std. Deviation
PET	3.18	6.55	4.7779	4	.57637
PDP	3.00	5.89	4.3082	5	.52236
PUP	3.10	6.75	4.7961	3	.58463
PRB	3.60	6.34	4.8207	2	.47971
PRS	2.00	7.00	5.7359	1	.89704

Testing of Hypotheses
Hypothesis # 1: PET is highly correlated with 'all' the Criterion Variables [H_1]

Table: 4
Correlation Table

		PET	PDP	PUP	PRB
Perceptions about the Educational Technologies	r	1			
	p	.			
Perceptions about the development practices	r	.758(**)	1		
	p	.000	.		
Perceptions about the use practices	r	.746(**)	.577(**)	1	
	p	.000	.000	.	
Perceptions about the eLearning problems	r	.834(**)	.745(**)	.708(**)	1
	p	.000	.000	.000	.
Perceptions about the Prospects of eLearning	r	.455(**)	.334(**)	.372(**)	.431(**)
	p	.000	.000	.000	.000

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

The relationship between the predictor and criterion variables is highest in all the analysis. The problems have extreme levels of colinearity and equality of variance with the predictor. The interrelationship is further established by the significance of correlation-analysis (r=0.834) between the predictor and Problems.

However, it is very surprising that the prospects of eLearning are very insignificantly related with the predictor.

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Although r of .455 is significant however, in comparison to other relationships this score is comparatively very low thereby indicating insignificant relationship between the predictor and criterion variable of 'perceptions about the prospects of eLearning in HEIs'.

Thus, predictor is correlated with all the criterion factors starting from r=0.834 (PRB), to r=0.758 (PDP), r=0.746 (PUP) and ending in r=0.455 (PRS).
Hypothesis # 2, 3, 4, & 5: PET determines PDP, PUP, PRB, & PRS ($H_{1,2,3,4,5}$].
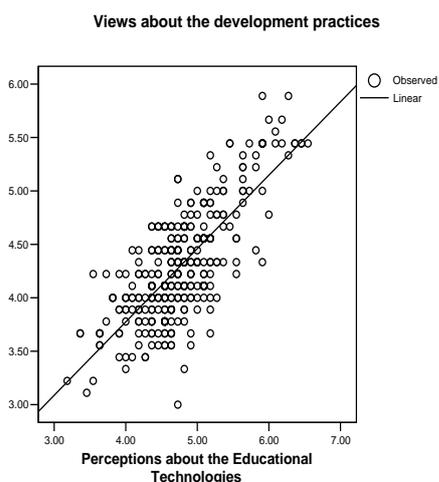
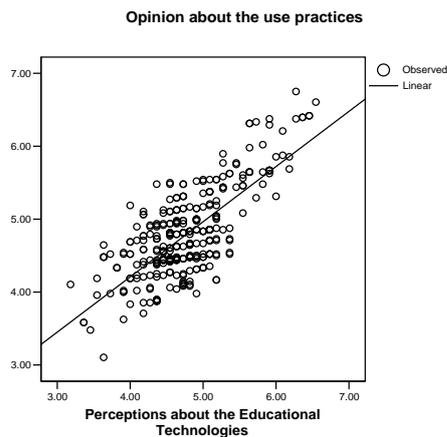**Figure: 1 Mapping of PDP on PET (H_2)**   **Figure: 2 Mapping of PUP on PET (H_3)**

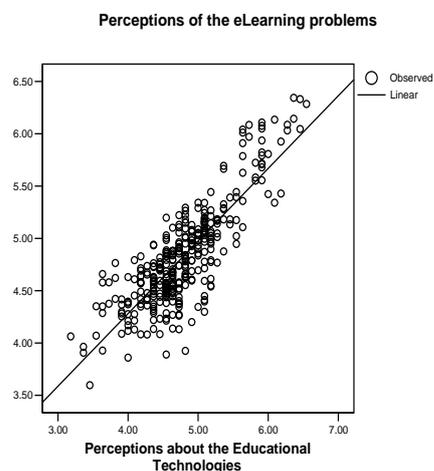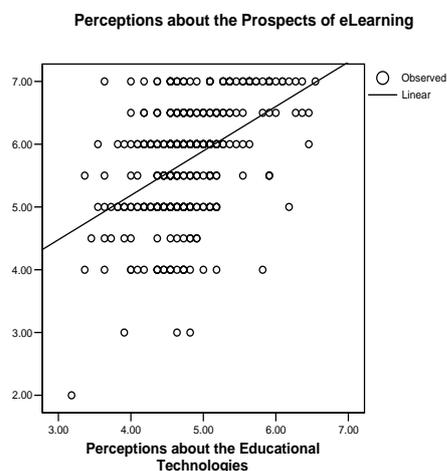**Figure: 3 Mapping of PRB on PET (H_4)**   **Figure: 4 Mapping of PRS on PET (H_5)**

Hypotheses 2, 3, 4, and 5 have been explained with the help of correlation-table (Table: 3) and scatter diagrams. The first portion has been analyzed above.

The scatter diagrams verify the findings of correlations. The thickness of histogram (Figure:3) is highest showing the co-variation of predictor and criterion variable of 'Problems of eLearning.' Then come the other relationships in 116

Figure: 1, Figure: 2 and lastly Figure: 4 confirm that the responses are dispersed showing comparatively minimum relationship between the variations of predictor and 'Prospects of eLearning.'

Hypothesis # 6: PDP depends on the Predictor [H_6]

Table: 4
Regression of PET on PDP (development)

R	R Square	Adjusted R Square	Std. Error of the Estimate	F df=1/352	Sig.
.758(a)	.574	.573	.34142	474.306	.000(a)
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	1.028	.152		6.772	.000
Predictor = PET	.687	.032	.758	21.779	.000

a. Predictor (Perceptions about the Educational Technologies - PET),
b. Dependent Variable (PDP)

Hypothesis # 7: PUP is determined by the Predictor [H_7]

Table: 5
Regression of PET on PUD (use)

R	R Square	Adjusted R Square	Std. Error of the Estimate	F df=1/352	Sig.
.746(a)	.557	.555	.38979	442.074	.000(a)
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	1.180	.173		6.813	.000
Predictor = PET	.757	.036	.746	21.026	.000

a. Predictor (Perceptions about the Educational Technologies - PET),
b. Dependent Variable (PUP)

Hypothesis # 8: PRB are explained by the Predictor [H_8]

Table: 6
Regression of PET on PRB (problems)

R	R Square	Adjusted R Square	Std. Error of the Estimate	F df=1/352	Sig.
.834(a)	.696	.695	.26505	804.267	.000(a)

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	1.504	.118		12.770	.000
Predictor = PET	.694	.024	.834	28.360	.000

a. Predictor (Perceptions about the Educational Technologies - PET),
b. Dependent Variable (PeP)

Hypothesis # 9: Predictor determines the PRS [H₉]

Table: 7
Regression of PET on PRS (prospects)

R	R Square	Adjusted R Square	Std. Error of the Estimate	F df=1/352	Sig.
.455(a)	.207	.204	.80016	91.661	.000(a)
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	2.356	.356		6.625	.000
Predictor = PET	.707	.074	.455	9.574	.000

a. Predictor (Perceptions about the Educational Technologies - PET),
b. Dependent Variable (PRS)

DISCUSSION

From the above analysis it is evident that most of the dimensions of eLearning in HEIs are determined by the perceptions of eLearning users about the educational technologies themselves. Whatever they perceive about the nature and role of ETS, the same is reflected in their opinion and attitudes about the development, use, problems and prospects of eLearning. However, one of the striking findings is that there is very nominal and insignificant relationship between the perceptions about ETS and the meaning attached with the prospects of eLearning in the higher education.

As highlighted in the literature, a huge body of research is exploring the impact of user-perceptions and theories on their attitude towards the development, use, problems and future success of eLearning in the higher education. For example, learners' preferred learning path depends on their personal characteristics like perceptions about technologies, and learning styles (Cagiltay et al., 2006). Likewise, teachers' attitudes have been found strongly related to their success in using technology (Bataineh & Abdel-Rahman, 2006). Even in the study of a higher education in England, it was found that in the administration of university, the top-management has different perceptions of education technologies than the lower levels of management (Valcke, 2004). Thus, the individual satisfaction and perception of technologies is closely related to the attitudes of an individual for participating and contributing to the use of eLearning (Klamma et al., 2007). Therefore, a rigorous research is needed regarding personal orientations, individual traits and their impacts on the construction of eLearning environments (Phillips et al., 2008).

Despite the efforts, teacher's ability to integrate technology into teaching and learning is still a big challenge requiring research and investments (Oh & French, 2004). For example, in a study of academicians of higher education in India, the respondents still have the perceptions about technology which are barriers to the successful integration of education technologies in teaching and learning. For example, majority of the respondents perceive technology as more complex and intimidating and required high administrative support (Mehra & Mital, 2007). Thus, successful digital initiatives in higher education are squarely dependent on the change in perceptions of the users about the nature and role of technologies in creating independent and self-regulatory learning in digital environments (Garcia & Qin, 2007).

CONCLUSIONS

Table: 8
The Impacts of Predictor (PET) on Criterion-variables

	Criterion variables		r	R2	Volume of Prediction
3	Perceptions about Problems of eLearning	PRB	.834	.696	70%
1	Perceptions about Development Practices	PDP	.758	.574	58%
2	Perceptions about Use Practices	PUP	.746	.557	56%
4	Perceptions about Prospects of eLearning	PRS	.455	.207	21%

- Problems are very significantly predicted by the perceptions about ETS. Correlation of problems with PET is .834 (in both the correlation & regression analysis), the highest in the analysis. Similarly, the histogram (Figure 4.3) of the same gives a picture where scores of both the variables closely cluster around the regression-line. Furthermore, 70% of variation in the problems is explained by the perceptions about ETS (R2 = 0.696).
- Secondly, the development practices are significantly related with PET in all above analysis. r=.758 and R^2=.574 – 58% of variation is development practices is explained by the predictor. Histogram (Figure 4.1) also creates a view of clustering both the variables around the regression line.
- Like PDP, use of the eLearning is also significantly dependent on the predictor at the third level after problems and development variables. In this relationship, r=.746, R^2=.557 therefore, 56% of the variation in PUP is determined by the predictor.
- The most insignificant relationship exists between the prospects (PPe) and perceptions about ETS. There is correlation of r=.455 and R2=.207 therefore only 21% of the changes in prospects are predicted by PET.

Thus, the most thought-provoking finding of the study is that perceptions about educational technologies are responsible for the magnitude of problems. It shows that there is gap between the perceptions and reality. This gap is verified by the higher scores on problems (average=4.8) and their significant dependence on the perceptions about technologies (R^2=0.696 = 70%). The average score on prospects is the highest (5.7359 in Table 4.2) but novelty is that this optimism has not been found related with the perceptions of eLearning in the HEIs of the country. There is no or very nominal relationship between the prospects and all other variables as evident from correlation table, histograms and regression analysis. So prospects (expectations) are not 119

stemming from the reality rather hype about the technologies but it is positive and promising. There is need of proper training and education to adjust the perceptions with reality and reality with perceptions.

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