

Full Length Research Paper

Prediction of the problems, user-satisfaction and prospects of e-learning in HEIs of KPK, Pakistan

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The research reveals that whatever is the perception and theory of a user about the ICTs and e-Learning environment, the same is reflected through his/her attitude toward using educational technologies for teaching and learning purposes. This study is about the measurement of relationships between the predictors (perceptions about educational technologies and the development and use practices) and the criteria variables (problems, satisfaction and prospects) among the e-Learning users in higher education institutions (HEIs) of North-West Frontier Province (NWFP), Pakistan. The research shows that 81% of problems, 57% of satisfaction and 23% of prospects is explained by the predictors. Furthermore, problems are explained by all four predictors; Satisfaction by three but prospects are predicted by two variables only. The surprising finding is that prospects are not defined by the 'existing development and use practices'. Rather, their perceptions about ICTs and e-Learning tools strongly forecast the prospects.

Key words: Perceptions about ICTs, educational technologies, e-learning development and use practices, user-problems, user-satisfaction, prospects of ICTs, e-learning.

INTRODUCTION

The research indicates that creation of e-Learning environment is not simply a technical matter rather demands the consideration of several human and social factors (McPherson and Nunes, 2004). Human perceptions about technologies determine their attitudes towards them (Aviram and Tami, 2004). Thus, the choice of education technologies should not be guided by a technologically deterministic approach rather according to the contextual requirements related to a broad range of social, cultural, political and economic factors (Macleod, 2005). In India, for example, most of the ICT education is reportedly ineffective because it is extra-technical and incompatible with local contexts (Ezer, 2006). There is also increasing acknowledgement that in order to ensure successful completion of e-Learning projects, the developers must possess technical skills as well as soft skills of interpersonal communication and understanding of human motivation problems (Jewels and Ford, 2006;

Qureshi et al., 2009; Nawaz and Kundi, 2010a).

Given that user behavior towards e-Learning tools is influenced by several factors, research has identified the perceptions and beliefs of human being as the major determinants of their practical attitude towards anything. Positive beliefs inspire the individuals to take interest while negative feelings motivate to stay away (Aviram and Tami, 2004). Based on these perceptions, every individual develops his/her own personal learning style (Sirkemaa, 2001).

Researchers have also found that most of the academicians believe that the best way of teaching is to teach according to the learner's personal learning style (LaCour, 2005). For example, the learning style of new generation of students "Net Genres (Barnes et al., 2007)" is reported to be more independent than the traditional student communities. Manochehr (2007) have reported that learning style is more important for the new generation learners than the traditional students. Thus, 'how users perceive ICTs?' determines their learning style, which is actually their practical behavior or attitude towards educational technologies. Tuning and adjustments

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at the perceptual level brings changes in the user-attitude. A successful e-Learning project depends on the creation of match between the user-perceptions, learning styles and the learning environment and tools (Qureshi et al., 2009).

The pedagogy, learning facilities and personalized learning environments are widely reported as the critical success factors. If they are positively and favorably perceived by the users, their motivation is ensured, which ultimately leads to greater interest and involvement of users in the learning through educational technologies (Nawaz and Kundi, 2010a, 2010c).

LITERATURE REVIEW

The predictors of user attitudes to e-Learning

User perceptions about educational technologies

Perceptions about the educational-technologies are widely used as the good predictors of user problems and satisfaction and thereby the prospects of success for the e-Learning efforts in HEIs (Graff et al., 2001). For example, a research reports that an understanding of teachers' perceptions of technology and its impact on their job helps in technology training programs and thus technology-integration into pedagogy (Zhao and Bryant, 2006). Likewise, students' use of computers and Internet depends on their perceived usefulness in terms of communication and access to information in completing their projects and assignments (Gay et al., 2006). However, very little research has been documented on students' perceptions of their computer literacy, particularly, in developing states (Bataneh and Abdel-Rahman, 2006). Furthermore, technology-paradigm-shifts have changed not only the way of computing but also the perceptions of society about the ICTs (Ezziane, 2007; Nawaz and Kundi, 2010c; Kundi and Nawaz, 2010).

ICT is generally perceived as an advantage for pedagogical purposes (Sasseville, 2004) however, "by compelling instructors to collaborate with people outside the classroom, technology can be perceived as a threat to the private practice of pedagogy (Aaron et al., 2004)." The relevant concern should be to understand how teachers perceive and address the challenges of new-age teaching and learning (Knight et al., 2006). Based on the perceptual differences of e-Learning users, Mehra and Mital (2007) have categorized, particularly teachers, into: (1) Cynics: They have negative perceptions about e-Learning but strong pedagogical beliefs therefore unwilling to change; (2) Moderates: They like ICTs and ready to change and adapt to new pedagogical practices with some guidance and training; and (3) Adaptors: These are the intellectual leaders who use e-Learning for inner progress and external enhancements by continuously innovating their pedagogy with latest

technologies.

Development practices

The experience of introducing different ICTs in the classroom and other educational settings all over the world suggests that the realization of the potential educational benefits of these new technologies is not automatic (Tinio, 2002). It is rather raising multiple debates over the substance, trajectory, purpose, and implications of ICTs in education. For example, ICTs can become an end in themselves rather than a means to support and enhance education (Sahay, 2004). In the context of globalization, international connectivity, instant communication through Internet and mobile technologies, the universities of all countries are confronted with huge challenges, both external and internal (Loing, 2005).

The effective integration of ICTs into the educational system is a complex, multifaceted process that involves not just technology but also curriculum and pedagogy, institutional readiness, teacher competencies, and long-term financing, among others (Tinio, 2002). The growth of innovative practices in e-Learning has contributed to the development of new skills and competencies and novel ways of using them within project teams (Gray et al., 2003). However, the design and development principles need to be aligned with teacher and instructors understanding of student requirements (Young, 2003). Because ICTs can contribute to learning, they cannot deliver learning and thus, the integration of pedagogy and learning models within the appropriate technology is essential to make e-Learning successful (Nyvang, 2006).

A research from universities by David Lewis and Ruth Goodison (2004) reveals that those who were using successful e-Learning-initiatives, strongly perceived that the "developments needed to be driven by pedagogy, not the technology." Likewise, data on e-Learning experiences in developed and developing countries provide enough evidence to understand that it is not technology (Jewels and 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. The pedagogical model is also part of the culture of the organization (Nyvang, 2006).

Use of e-learning

Given the differences of perceptions (Young, 2003) users behave differently while using the e-Learning tools and techniques for teaching and learning purposes. A key challenge for institutions is overcoming the cultural mindset whereby departments and individuals act as silos, keeping information and control to themselves (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).

In developing countries, "ICTs have not permeated to a great extent in many higher learning institutions in most developing countries due to many socio-economic and technological circumstances (Sife et al., 2007)." The greatest challenge in learning environments is to adapt the computer-based system to differently skilled learners. If the environment is too complex the user will be lost, confused or frustrated. On the other hand, too simple or non-systematic environments cause motivational problems (Sirkemaa, 2001). Technology is by nature disruptive, and so, demands new investments of time, money, space, skills and changes in the way people do things (Aaron et al., 2004). Furthermore, face-to-face communication is critical for classroom social relationships and interpersonal processes while, online technologies have reduced support for social interaction. Although emotions can be conveyed through e-mail or chatting, it does not replace "the fundamentals of our socio-emotional well-being (Russell, 2005)." Thus, "barriers can make technology use frustrating for the technologically perceptive, let alone the many teachers who may be somewhat techno-phobic (Ezziane, 2007)."

Criterion variables

User problems of e-learning

"More than half of all information technology projects become runways— overshooting their budgets and timetables while failing to deliver on their goals (McManus and Wood-Harper, 2004: 3)." Similarly, "While networked learning is making its appearance in universities, its overall 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 (Drinkwater et al., 2004; Bondarouk, 2006; Vrana, 2007; Kanuka, 2007; Sife et al., 2007; Wells, 2007) such as:

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

The user-resistance and reluctance to change is widely investigated topic in e-Learning (Jager and Lokman, 1999; Sasseville, 2004; Loing, 2005; Vrana, 2007; Kanuka, 2007; Mehra and Mital, 2007). Since, teachers decide about what happens in the classroom therefore their acceptance plays a dominant role in the successful use of computers in the classroom (Aaron et al., 2004). Although most of the teachers have adopted ICTs like power point slides and internet into their teaching, they are still unwilling to adopt more sophisticated computer-based teaching innovations (Mehra and Mital, 2007)."

Within universities, the implementation of ICT is not an easy task for instance, decision makers and academics are sometimes reluctant to change curricula and pedagogic approaches (Loing, 2005). There are many obstacles for implementation of the ICT in universities. Some of them are classical, for example inertia of behavior of people, their resistance to changes, etc. If ICTs are expected to serve properly, it should enforce an order in all aspects of university life. People who lose their advantage of the better access to information have a fear from order. Regrettably, managers sometimes belong to this category (Vrana, 2007).

User satisfaction

The research indicates that users are rarely satisfied with the functionalities of new e-Learning systems and worried about the problems of integrating the system with other organizational systems (Drinkwater et al., 2004; Russell, 2005). The HEIs are constantly facing problems of "user dissatisfaction with newly introduced systems, mismatches between a new technology and the existing work practices, underestimating the technological complexity for employees, and inefficient end-user support (Bondarouk, 2006)." The individual satisfaction is closely related with the commitment of the individual to participate and contribute (Klamma et al., 2007). Similarly, "a match between learning style and teaching style reveals increases in student achievement and satisfaction (Manochehr, 2007)."

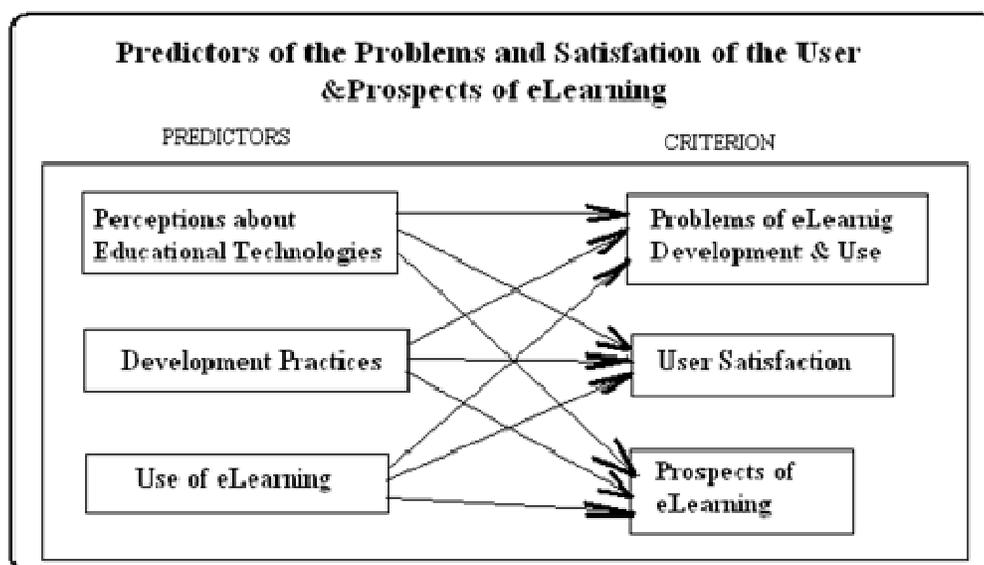
Mixed results have been reported about the user-satisfaction from e-Learning systems around the world. Irons et al. (2002) report that "users of new e-Learning systems are less satisfied than those using the traditional methods of teaching and learning." While, Radosevich and Kahn (2006) found high levels of satisfaction (mean = 6.02 on 7-point scale). However, as discussed earlier, satisfaction is dependent on a number of factors including the personal characteristics, environmental pressures and the e-Learning facilities available.

Prospects of e-learning

Education determines, more than anything else, a country's prospects for human development and

Table 1. List of the research variables.

Predictors	Working Definitions	Code
1 Perceptions about educational technologies	Perceptions about the overall Nature and Role of ICTs and educational technologies.	PRC
2 Development practices	Attitudes about different aspects of the e-Project management for developing e-Learning environments.	DEV
3 Use of e-Learning	Volume of use, Perceived ease of use (PEU), Perceived usefulness (PU)	USE
Criterion		
1 User problems	The problems of developing and using e-Learning.	PRB
2 User satisfaction	The user-satisfaction from e-Learning.	STF
3 Prospects of e-Learning	The future of e-Learning (expectations).	PRO

**Figure 1.** Theoretical framework.

competitiveness. Fortunately, the information revolution offers some extraordinary opportunities in education (MoST, 2000). Universities and even smaller departments within organizations are becoming capable to afford sophisticated digital systems (Ezziane, 2007). Electronically supported processes in the teaching and administrative spheres do not seem to be displacing traditional ways of doing things. Rather, the outcomes are often a matter of the new 'virtual' and the old 'traditional' notions of the university co-existing in a tense relationship (Goddard and Cornford, 2007).

Furthermore, literature suggests a host of prospects for the increasing role of ICTs in education, in general, and educational technologies in particular. For example, global availability of ICTs (Tinio, 2002); paradigm-shifts in e-Learning (Young, 2003); free and open sources systems (FOSS) (Stephenson, 2006; Institutional,

national and international partnerships (Baumeister, 2006); local ICT professionals (Bajwa, 2006; Hameed, 2007); and growth of information-culture (Klamma et al., 2007).

Predictor and criterion variables

Here the list of the research variables on e-learning is presented (Table 1).

Theoretical framework

Here the figure on the predictors of the problems and satisfaction of user and prospects of e-learning is presented (Figure 1).

RESEARCH DESIGN

"ICTs are a mainstream issue in higher education (Valcke, 2004)" where efforts are made to answer the question "has the use of ICT really affected the learning process and outcomes? (Drinkwater et al., 2004)." For this purpose, a wide research is going on in almost every state to understand the role of ICTs in HEIs to position their institutions in a competitive stance by digitizing their pedagogy, learning and educational management (Maddux et al., 2005).

Survey approach

There is a huge body of studies both in developed and developing countries about the theories and practices of e-Learning in HEIs both from qualitative and quantitative perspectives. The quantitative studies, which used survey approach to access the problem situation are many for example, by Irons et al., 2002, Luck and Norton 2005, Marcella and Knox (2004), Abrami et al., 2006, Johnson et al., 2006, Radosevich and Kahn (2006), Bataineh and Abdel-Rahman (2006), Thomas and Allen 2006, Mehra and Mital (2007), Martin and Dunsworth 2007, Garcia and Qin (2007), and DiCerbo (2007) – which are a few from a long list.

Population and sampling

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.

Over 388 questionnaires were distributed to the teachers, students and administrators. The response rate was: teachers 137; students 132 and administrators 85 = 354 (92%). The number of subjects in the teacher and student groups was increased to include the representation from more subjects that were not included in the pilot study, particularly from social sciences. The data was collected from June 2008 to August 2008.

Data collection and analysis

Literature survey: Literature survey was conducted to examine the existing research on the topic and extract variables, the relationships between the variables as identified by the researchers. The researchers used Books and e-Books; Free and Open Source Systems (FOSS), that is., e-Journals; websites of United Nations, Universities, Government and higher education institutions of NWFP, Pakistan.

Questionnaire: The instrument included questions about demographics (11 variables), perceptions, educational technologies, development, use, user, issues, opportunities, satisfaction and prospects (8 variables and 38 items on 7-point scale representing 1=Strongly disagree, 2=Mildly disagree, 3=Disagree, 4=Neutral, 5=Agree, 6=Mildly agree, and 7=Strongly agree.).

Data analysis: Primary data from questionnaire was keyed into SPSS 12.0 to create a database. Data was analyzed into descriptive tables and charts. Furthermore, for testing of

hypotheses, multiple-regression analysis procedure was run to measure regressions of the predictors on every criterion variable collectively and individual.

Instrument validity: The overall reliability of Cronbach's alpha was estimated at 0.9288, with 354 cases and 38 survey items. This value exceeds the required minimum threshold suggested for the overall reliability test, that is, 0.7 (Koo, 2008).

FINDINGS OF THE STUDY

The objectives of testing hypotheses are to find answers for the following questions:

1. Hypothesis # 1: What is the strength of correlations between the predictors and criterion variables? (H_{a1})
2. Hypothesis # 2: How far are the user-problems explained by the Independent variables? (H_{a2})
3. Hypothesis # 3: Is user-satisfaction determined by the predictors? (H_{a3})
4. Hypothesis # 4: Does the prospects of e-Learning in HEIs depend on the predictors? (H_{a4})

Correlation analysis

Hypothesis # 1 predictors are highly correlated with the criterion variables. (H_{a1})

The correlation between predictors and criterion variables are significant:

1. The PROBLEMS are highly correlated with the predictors (PRC=.746; ETS=.834; DEV=.745; USE=.708) and thus stand on the top of correlations with predictors
2. Similarly, SATISFACTION comes second (PRC=.486; ETS=.732; DEV=.665; USE=.506).
3. The lowest correlations exist between the prospects and predictors (PRC=.409; ETS=.455; DEV=.334; USE=.372). Though these are significant in broader terms as they stand greater than the common threshold of significance (3.0) in social sciences, but insignificant in relation to the correlation scores of other criterion variables with predictors (Table 2).

Regression analysis

$H_{#2}$: Problems are predicted by the independent variables (H_{a2})

Table 3 tells that R^2 is 0.812, which means that 81% of variation in the dependent variable is explained by the predictor variables. Similarly, the p-values of ANOVA and coefficients of regression are highly significant and mostly score beyond 0.00, indicating significant levels of interdependence between predictors and the problems faced by users of e-Learning in HEIs of NWFP, Pakistan.

Table 2. Correlations.

		PET	DP	UP	STF	PRB	PRS
PET	r	1	0.758	0.746	0.732	0.834	0.455
	p	.	0.000	0.000	0.000	0.000	0.000
DP	r	0.758	1	0.577	0.665	0.745	0.334
	p	0.000	.	0.000	0.000	0.000	0.000
UP	r	0.746	0.577	1	0.506	0.708	0.372
	p	0.000	0.000	.	0.000	0.000	0.000
STF	r	0.732	0.665	0.506	1	0.718	0.203
	p	0.000	0.000	0.000	.	0.000	0.000
PRB	r	0.834	0.745	0.708	0.718	1	0.431
	p	0.000	0.000	0.000	0.000	.	0.000
PRS	r	0.455	0.334	0.372	0.203	0.431	1
	p	0.000	0.000	0.000	0.000	0.000	.
	N	354	354	354	354	354	354

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

Table 3. Regression of predictors on problems.

R	R square	Adjusted R square	Std. error of the estimate	F	Sig.
0.861(a)	0.741	0.739	0.24511	334.043	0.000(a)
		Unstandardized coefficients		Standardized coefficients	
	B	Std. Error	Beta	t	Sig.
(Constant)	1.077	0.122		8.828	0.000
Perceptions about educational technologies (PET)	0.414	0.043	0.497	9.722	0.000
Development practices (DP)	0.239	0.038	0.261	6.256	0.000
Use practices (UP)	0.153	0.034	0.187	4.571	0.000

a. Predictors: (Constant), PET, DP, and UP; b. Dependent Variable: Problems of e-Learning.

The problems are determined by all four predictors.

H_{#3}: Satisfaction is determined by the Predictors (H_{a3})

User-satisfaction from e-Learning is 57% with R² of 0.0571 (in Table 4). Three of the predictors (educational technologies, development and use) determine the variations in user-satisfaction. Surprisingly, perceptions are playing no role in explaining the variance of criterion variable (p-value = 0.163, which is well above the required alpha (0.05) for significance)

H_{#4}: Prospects are predicted by the Independent Variables (H_{a4})

Table 5 reveals the most unexpected and research-provoking finding of the study. This finding shows that the

prospects variable is very poorly defined by the predictors (R² = 0.229). Only perceptions and educational technologies were measured having impacts on the Prospects with p-values of 0.003 and 0.001 respectively. Both development and Use have no connection whatsoever on the Prospects of eLearning in HEIs of NWFP, Pakistan with very powerfully negating p-value of 0.983 for development and 0.792 for Use of educational technologies.

Table 6 gives a Birdseye view of the regression analysis.

Examining the columnar information

1. The Perceptions about 'Educational-Technologies' are explaining all the dependant variables with very high p-

Table 4. Regression of predictors on user-satisfaction.

R	R square	Adjusted R square	Std. error of the estimate	F	Sig.
0.754(a)	0.569	0.565	0.42967	153.869	0.000(a)
	Unstandardized coefficients		Standardized coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	0.242	0.214		1.133	0.258
Perceptions about Educational technologies (PET)	0.685	0.075	0.606	9.185	0.000
Development practices (DP)	0.327	0.067	0.262	4.879	0.000
Use practices (UP)	-0.109	0.059	-0.098	-1.857	0.064

a. Predictors: (Constant), PET, DP, and UP; b. Dependent variable: Satisfaction of the users.

Table 5. Regression of predictors on prospects.

R	R Square	Adjusted R square	Std. error of the estimate	F	Sig.
.457(a)	0.209	0.202	0.80109	30.877	0.000(a)
	Unstandardized coefficients		Standardized coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	2.270	0.399		5.691	0.000
Perceptions about educational technologies (PET)	.654	0.139	0.420	4.699	0.000
Development practices (DP)	-0.046	0.125	-0.027	-0.370	0.712
Use practices (UP)	0.113	0.110	0.074	1.033	0.302

a. Predictors: (Constant), PET, DP, and UP; b. Dependent Variable: Prospects of e-Learning in higher education.

Table 6. Overall Significance of the coefficients of regression (p-values).

	Perceptions p-values	Educational technologies p-values	Development p-values	Use p-values
1 Problems	0.000	0.000	0.000	0.021
2 Satisfaction	0.163	0.000	0.000	0.032
3 Prospects	0.003	0.001	0.983	0.792

values of 0.000, 0.000, and 0.001 on Problems, Satisfaction and Prospects.

2. All rest of the predictors (Perceptions, educational-technologies, development and use) is predicting two of the criterion variables each.

3. Existing ‘development and use’ is not predicting the prospects (p-values are 0.983 and 0.792 for development and use respectively).

Examining the information in rows

1. Problems are Predicted by All FOUR (4/4) the predictors.
2. Satisfaction is Determined by THREE (3/4) of the

independent variables. The Perceptions about the overall role of ICTs do not predict satisfaction but the views about existing educational technologies, development, and use practices are the strong predictors of User-Satisfaction.

3. Only TWO variables (2/4) are explaining the prospects.

Summary of results

Figure 2 shows that 81% of problems is explained by the predictor variables. 57% of user-satisfaction is determined by independent variables. But surprisingly, only 23% of prospects is explained by the predictors. This trend indicates that user views about ICT-related problems

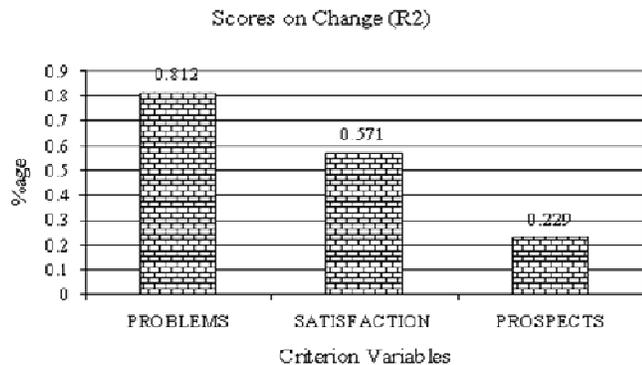


Figure 2. Summary of Hypothesis (R² Values).

and satisfaction are dissociated with their perceptions of the prospects. However, this situation can also be explained in a different manner, namely, the users are 'optimistic' about the future role of ICTs, despite their negative feedback on their experiences with ICTs, educational technologies and the development and use practices of e-Learning in HEIs.

Conclusions

After presenting the literature and empirical findings about the regression of three predictors or independent variables (perceptions about educational technologies, development and use practices) on the dependent or criterion variables (e-Learning problems, user satisfaction and prospects in the higher education of KPK, Pakistan), interesting conclusions can be drawn, for example:

1. User perceptions are the most significant predictors of every criterion variable. It reveals the importance of the knowledge and beliefs of teachers, students and administrators in determining the success and failure of ICTs in HEIs of KPK, Pakistan. There is urgent need to develop and implement plans which aim at changing the mindset of the users by increasing their know-how of new technologies and the roles of e-Learning for teachers, students and administrators.
2. Another results-based but surprising conclusion is that the user-satisfaction is not dependent on his/her own perceptions about ICTs. User-satisfaction is more practice oriented as it has been determined by their opinion about the educational technologies and development and use practices. Thus, user attitudes need to be managed by addressing the problems of technologies in education and the effort made to integrate them into the educational system.
3. The most unexpected finding about the determination of prospects not by the development and use practices rather perceptions about ICTs and educational technologies drives us to conclude that the future of e-Learning in HEIs of KPK is less dependent on the

development and use efforts rather user perceptions about the digital technologies in general and educational digital initiatives in particular.

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