Higher Education in Pakistan: An ICT Integration Viewpoint

Zaffar Ahmed Shaikh and Shakeel Ahmed Khoja

Abstract— **This study measures expert opinion of Pakistani higher education system (HES) experts on what role Information and communication technologies (ICTs) can play in shaping the future of Pakistani HES. Suggestions are formulated in higher education (HE) policy & planning, and provision of essential technological infrastructure. For this purpose, a 35-item literature-based questionnaire was developed for modified version of Delphi study which spanned to two rounds; and administered to 30 participants randomly selected from urban and rural areas of Pakistan. Results revealed significant gaps in ICT demand and supply, ICT use, ICT-based HE problems, reasons for delays in ICT integration, and gave suggestions for developing ICT-driven HES in Pakistan. Participants suggested that an effective ICT integration in Pakistani HES will play a crucial role and brighten its future. They look it a way, how Pakistan can add his share in fostering this knowledge-based society.**

Index Terms–**Higher education, information and communication technology, modified delphi method, Pakistan.**

I. Introduction

State of any education system is determined through quality of its HES. Developed world considers HE of utmost importance for social/economic progress & creation of knowledge-based society. This 'new' society requires embracing new development challenges & opportunities that recent rapid evolution in ICT has brought about. Researchers [1]-[3] suggest ICT a powerful tool in HE in less developed countries in their study and [4]-[5] consider ICT a strong agent for change among many educational practices especially at HE level. Today HESs of world face diverse set of problems, [6]-[7] found out that HESs of less developed world are under immense external & internal pressure to improve on their policy & delivery performance as (1) most students enter university under-prepared; (2) growth in enrollment; and (3) of rapidly changing society pressures due to the emergence of ICTs in everyday life. Ather and Qamar [8] highlighted in their research that Pakistan considers ICT the life-line for growth in 21st century, consequently it designed cautious ICT policies to encourage use of ICT in education, but due to paucity of resources & political issues such as inconsistencies in policies, the Government of Pakistan is constrained to follow a non-optimal strategy for enhancement in the ICT sector. Thus, for Pakistan, to succeed in 21st century, design & implementation of an effective & robust ICT policy for its HES is critical.

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II. Methodology

A 35-item instrument (32 items of Round-I and three more suggested during Round-I responses) was designed. Using modified Delphi method with two rounds, this study surveyed 30 HE experts selected from five categories – faculty members, students, parents, administrative staff, and ICT policy makers. Each one of them from: Karachi, Islamabad, Punjab, Khyber Pakhtunkhwa, Baluchistan, and Sindh.

III. Analysis of Data

Out of 36 participants, 30 were selected & were requested to be there throughout the end of study. Participants included both male & female, out of which 21 (70%) were male & 9 (30%) were female.

The Delphi instrument designed for this study consisted of two parts in Round-I; Part-A (Questionnaire Form-1 & Form-2) & Part- B (Suggestions/comments) & only one part (Part-A) in Round-II. Questionnaire Form-1 asked participants their views on which & to what extent ICTs use today & in near future, that Faculty/Students/Staff use in their job-related tasks & Questionnaire Form-2 focused on need of ICTs, ICT-related problems/challenges & their solutions, recommendations & forecast for future of HES of Pakistan. In Round-II Questionnaire, participants were requested to review their response with that of group mean response & once again rate each task in order to reach on final consensus. Any suggestions/comments given in Round-I were included in italic print in Round-II Questionnaire. Results were calculated and ≤ 0.5 average variability in responses was considered for required level of consensus building process among participants.

A. Analysis

Analysis of data is done with MS Excel; responses percentages, mean scores for central point of data set, SD for variability in responses and consensus of percent use or percent agree are calculated.

Mean scores were calculated by assigning values from 5 to 1 with 5 assigned to strongly agree, 4 to agree, 3 to uncertain, 2 to disagree & 1 to strongly disagree. Table I describes results of study in detail.

IV. Findings

Please refer Table I for Question numbers & description.

1) (Questions 1-10), 49% present use with mean score of 3.00 & 100% future use with mean score of 4.96 was calculated. Response rate remained around 96% in both rounds of Delphi.

TABLE I: SHOWING DELPHI RESULTS

#			ROUND-I				ROUND-II			
	DESCRIPTION OF ITEMS		Participation	Mean	SD	Consensus	Participation	Mean	SD	Consensus
1.	**Tasks that Faculty/Students/Staff Perform in their work** Planning, Developing & Organizing instruction	Present	97%	3.43	.73	50%	100%	2.93	.45	50%
		Future	100%	4.87	.35	100%	100%	5.00	.00	100%
2.	Housekeeping & Record keeping Tasks	Present	100%	3.37	.81	50%	100%	3.07	.58	50%
		Future	100%	4.87	.35	100%	100%	5.00	.00	100%
3.	Managing Student Conduct	Present	100%	3.03	.96	50%	100%	3.07	.58	50%
		Future	100%	4.73	.79	100%	100%	4.97	.18	100%
4.	Presenting Subject Material / Teaching	Present	100%	3.47	.68	50%	100%	3.13	.43	50%
		Future	100%	4.87	.35	100%	100%	4.97	.18	100%
5.	Assessing Student Learning	Present	100%	2.77	.77	50%	100%	2.97	.49	50%
		Future	100%	4.63	.61	100%	100%	4.87	.35	100%
6.	Academic Research	Present	100%	2.97	.85	50%	100%	2.90	.40	50%
		Future	100%	4.83	.38	100%	100%	5.00	.00	100%
7.	Administrative Support	Present	100%	3.83	.79	75%	100%	3.10	.31	50%
		Future	100%	4.73	.45	100%	100%	4.90	.31	100%
8.	**Meeting Professional obligations / Self Study**: Using Social networks / forums in quest of knowledge	Present	97%	2.67	1.09	50%	100%	3.03	.49	50%
		Future	100%	4.73	.64	100%	100%	5.00	.00	100%
9.	Database / Library Research & Information e.g. IEEE, ACM	Present	93%	3.46	.88	50%	100%	3.20	.41	50%
		Future	87%	4.85	.46	100%	97%	5.00	.00	100%
10	Group Discussion/Supervision/Training (Live supervision by video camera, conducting training workshops	Present	97%	2.79	1.32	50%	97%	2.21	.56	25%
		Future	97%	4.41	.68	75%	100%	4.93	.25	100%
	Results showing Average of 'Professional obligations'	*Present*	*96%*	*2.97*	*1.10*	*50%*	*99%*	*2.81*	*0.49*	*42%*
	Results showing Average of 'Professional obligations'	*Future*	*95%*	*4.66*	*0.59*	*92%*	*99%*	*4.98*	*0.08*	*100%*
	Average Results of Questions (1-10) showing PRESENT USE		**99%**	**3.23**	**0.84**	**53%**	**100%**	**3.00**	**0.47**	**49%**
	Average Results of Questions (1-10) showing FUTURE USE		**99%**	**4.77**	**0.48**	**99%**	**100%**	**4.96**	**0.14**	**100%**
11	Common ICT tools/applications	Present	93%	4.82	.93	100%	100%	4.97	.18	100%
		Future	97%	4.8	.40	100%	100%	5.00	.00	100%
12	Educational/Research ICT tools:	Present	100%	3.43	.50	50%	100%	3.10	.31	50%
		Future	100%	4.70	.40	100%	100%	5.00	.00	100%
13	Rely on ICTs		100%	4.13	.78	75%	100%	4.07	.25	75%
14	Use of ICTs		100%	4.30	.60	75%	100%	4.07	.25	75%
15	Help by ICTs		100%	3.87	1.11	75%	100%	4.00	.37	75%
16	**Causes:** Poor distribution of ICTs, lack of robust ICT policy		100%	4.17	1.15	73%	100%	4.53	.68	87%
17	**Integration: EPP :** Inadequate technological infrastructure		100%	4.23	.82	83%	100%	4.40	.67	90%
18	Under funding, high cost of sustainability of the technology		93%	4.11	.79	75%	93%	4.29	.66	86%
	Average Results of Questions (17-18)		*97%*	*4.17*	*0.81*	*79%*	*97%*	*4.35*	*0.67*	*88%*
19	**Expertise:** Staff training, lack of ICT experts, lack of ICT skills		100%	4.30	.79	93%	100%	4.47	.51	100%
20	**Language & Educational Content Development**		97%	2.79	1.01	31%	90%	3.93	.77	89%
	Average results of Questions (17-18,19,20)		**98%**	**3.75**	**0.87**	**68%**	**96%**	**4.25**	**0.65**	**92%**
21	**Reasons for Delay :** Teachers' lack of ICT competencies		100%	4.30	.70	87%	97%	4.47	.57	93%
22	Lack of money leading to limited access to computers & software		97%	4.55	.69	97%	100%	4.60	.50	100%
23	Lack of creativity & unwillingness to change the running system		100%	4.43	.68	90%	100%	4.53	.51	100%
24	Difficulty in linking ICT to the curriculum		100%	2.77	1.28	37%	100%	2.37	.49	0%
25	Needing ICT facilities in lecture halls rather than in computer labs		100%	4.10	.71	80%	100%	4.30	.60	93%
	Average Results of Questions (21-25)		**99%**	**4.03**	**0.81**	**78%**	**99%**	**4.05**	**0.53**	**77%**
26	**Suggestions :** Guidelines, time-bound targets, political commitment		100%	4.53	.63	93%	100%	4.65	.55	97%
27	Rigorous analysis of the present state of the HES		100%	4.47	.57	100%	100%	4.61	.50	100%
28	Piloting of the chosen ICT-based model. For testing		100%	4.30	.53	97%	100%	4.58	.50	100%
29	Specification of existing sources of financing		100%	4.47	.57	97%	97%	4.65	.49	100%
30	Authorities should provide high tech ICT facilities & scholarships		100%	4.60	.62	93%	97%	4.80	.41	100%
31	HES of Pakistan demands target-oriented, robust & effective ICT policy		100%	4.70	.47	100%	100%	4.77	.43	100%
32	Effective ICT integration will enlighten the future of HE of Pakistan		100%	4.67	.55	97%	100%	4.80	.41	100%
	Average Results of Questions (26-32)		**100%**	**4.53**	**0.56**	**97%**	**99%**	**4.69**	**0.47**	**100%**
33	*ICT Demand in HEIs*		--	--	--	--	*90%*	*3.12*	*.61*	*75%*
34	*ICT Supply in HEIs*		--	--	--	--	*93%*	*2.31*	*.67*	*50%*
35	*Problem of Attitude. Grabbing resources & misuse them.*		--	--	--	--	*93%*	*4.53*	*.73*	*100%*

2) (Questions 11 & 12), 100% present use of common tools with mean score of 4.97 & 50% educational /research tools with mean score of 3.10 was calculated. And 100% future use of common tools with 5.00 mean & 100% of educational/research tools with mean of 5.00 was recorded. Response rate remained 98%.
3) A consensus of 75% rely on ICTs, 75% ICT tools usage & 75% help being provided by ICTs to

Faculty/Students/Staff is recorded with mean scores of 4.07, 4.07 & 4.00. Response rate remained 100%.

4) Causes of deprived standard of HE of Pakistan rated 4.53 with 87% participants agree on these causes. Response rate recorded is 100% (Question 16).
5) On ICT integration challenges an agreement of 88% with mean score of 4.35 for educational policy & planning challenges, 100% & 4.47 for expertise challenges, & 89% & 3.93 for language & educational content development challenges was recorded. Response rate remained 98%. An overall agreement of 92% is recorded (Questions 17-20).
6) (Questions 21-25). 77% participants with 99% response rate & 4.05 mean score showed their agreement on reasons of delay in integration of ICTs (Refer Fig. 1).

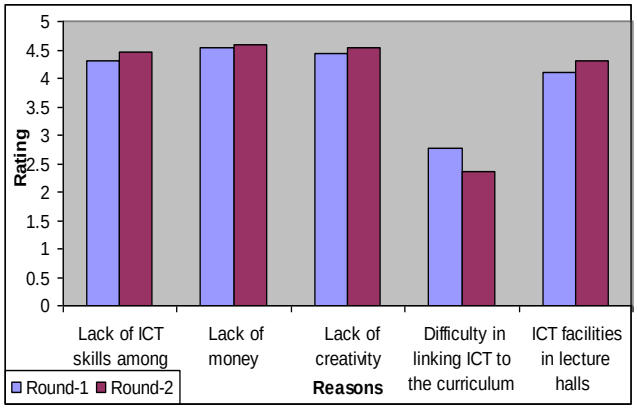

Fig. 1. Reasons for delay in integration of ICTs in HEIs

7) Implications/suggestions for ICT-enhanced HE & future of HES of Pakistan were rated 4.69 with 100% agreement (Questions 26-32) (Refer Fig. 2).

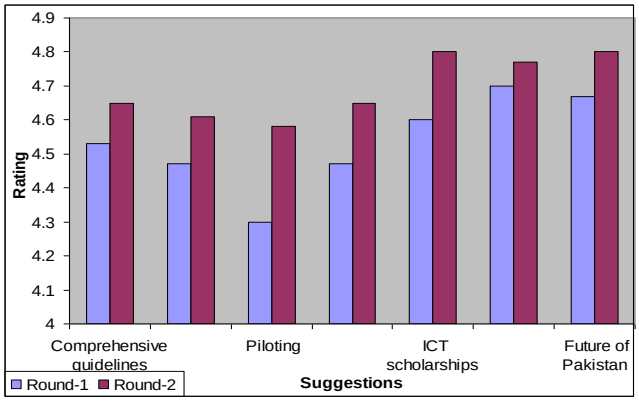

Fig. 2. Suggestions for ICT-enhanced HE

8) ICT demand & supply topics (suggested by participants in Round-I responses), demand of ICTs rated 3.12 with 75% demand & supply of ICTs rated 2.31 with 50% supply.
9) Attitude problem is also recommended as one of the problems/causes of deprived standards of HE. A Consensus of 100% with 4.53 mean is recorded.
10) Variability in responses (data of SD column) from higher values in Round-I to lower values in Round-II shows consensus building process (Refer Fig. 3).
11) In response to participants suggestions/comments in Round-I, Part-B, only 10% participants (3 participants) came up with comments/suggestions.

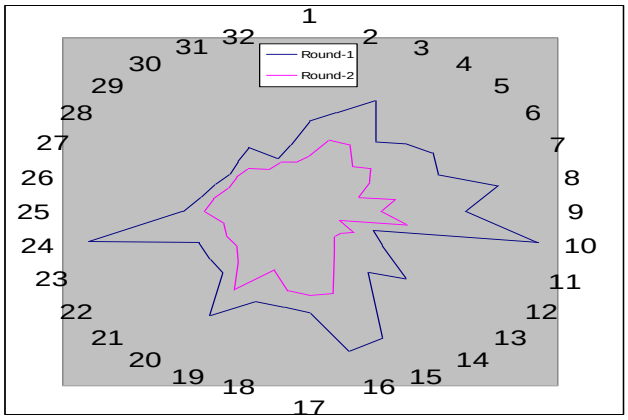

Fig. 3. Consensus building process among participants

V. Results

The conclusions have been drawn on the basis of findings of the study:

1) Although current use of ICT tools/applications in those HEIs of Pakistan is sufficient which are in big cities, but on country basis, their use is 50% as suggested by this study, half as compared to near future (Year 2019)/developed countries (where ICTs use is 100%).
2) Educational/research tools are supposed to be used extensively in near future but unfortunately, as suggested in this study, their current use is 50% which is not a good figure.
3) This study concludes that university personnel should use 75% ICT tools/applications in their job related tasks and 75% rely on ICTs, cutting behind 25% due to local infrastructure, policy mechanisms & confidence level of participants on ICTs. In participants' views, help provided by ICTs to university personnel in their job related tasks is 75%.
4) Major causes of deprived standard of HE are: (1) poor /uneven distribution of ICT resources/infrastructure, (2) high ICT expenditures & lack of money, (3) poor/lack of robust & effective ICT policy, (4) defining the role of ICT as cure-all for organizational transformation, (5) making ICT responsive to the organizational vision & mission, and (6) developing a non-systemic method of implementation of ICT policy.
5) Participants highlighted inadequate technological infrastructure, under funding & high cost of sustainability of the technology as Educational policy & planning challenges, ongoing teachers/staff skills development trainings/workshops, lack of ICT competencies among support/teaching staff as challenges related with expertise & they suggest that major portion of educational material is available in English language & there is a need to develop/design that material in local/regional language as language & educational content development challenges.
6) Reasons for delay in integration of ICTs in HE include: (1) Teachers' lack of ICT competencies as they spend a little time to learn ICT skills (2) Lack of money leading to limited access to computers & software (3) Lack of creativity & willingness to change the running system (4) Needing ICT facilities in lecture halls rather than in

computer labs etc. However, difficulty in linking ICT to the curriculum was not considered very important.

7) This study suggests (1) Development of a systemic & politically committed method of implementation of robust, effective & target-oriented ICT policy (2) adequate provision of technological resources such as fast/affordable internet connectivity, availability of latest/contemporary ICTs in HES, sustainable availability of electricity & telephony, access to computers in schools/communities & households, affordable teleconferencing facilities, free access to digital libraries /online books/articles/magazines etc., (3) modifications in HE ICT curricula emphasizing both theoretical as well as practical use of ICTs (4) Piloting of the chosen ICT-based HE model before implementation on ground, (5) Rigorous analysis of the present state of the HES such as curriculum, pedagogy, infrastructure, capacity building, language & educational content & financing (6) Specification of existing sources of financing & development of strategies for generating financial resources to support ICT use over long term (7) identification of stakeholders & harmonizing of their efforts across different interest groups. Participants of this study suggest that HES of Pakistan demands ICT policy with clear & specific objectives, guidelines & time-bound targets, with mobilization of required resources & the political commitment at all levels to see the initiative go through to enhance & reform HE through ICTs.
8) Participants identified a major gap in demand & supply of ICTs in HEIs i.e. 25%. In their views current demand of ICTs is 75% but only 50% is provided.
9) This study strongly agrees on the attitude problem & comments that: HEIs have the biggest problem of attitude. They mostly have the finance but they don't know how to utilize it properly for ICT. They sometime spend money in terms of ICT with doing cost benefit analysis due to which they acquire inappropriate items. Similarly grabbing resources & misuse them is a common culture in Pakistan, due to which nothing ends up in a right way.
10) Overall variation in views is less than 0.5 which suggested that participants have reached to a strong consensus level.
11) Only 3 participants (10%) came up with comments /suggestions (ICT demand, supply & problem of attitude) which declares that the instrument designed was comprehensive.

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