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Knowledge and use of information communication technology by the scientists

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ABSTRACT

The present study was undertaken to ascertain the knowledge of scientists regarding ICT, its use by them in teaching, research and extension and problems being faced by them in the use of ICT. A sample of 200 scientists working in teaching, research and extension system of the PAU was drawn by using probability proportional to size (PPS) sampling technique. The data were collected by using distributed questionnaire approach. The findings of the study revealed that majority of the scientists were male, had Ph.D educational qualification and belonged to farming family and were in age group of 44 to 56 years, hailed from rural families, were Associate Professors, most of them belonged to total annual income group of 7-11 (lakhs Rs.) and had service experience of 7-15 years with two trainings. The findings of the study further indicated that two-third of the scientists had high level of knowledge of ICT mainly for the purpose of computer information retrieval or data updating while more than half of them had experience in computer use up to 5 years. It was further noticed that among various ICT facilities available, Internet accessing had an added advantage of its ready availability as compared to other ICT tools. The major problem faced by the scientists in the use of computers was the lack of regular training. Therefore, they suggested that scientists should be trained regularly from time to time.

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INTRODUCTION

Information Communication Technology (ICT) encompasses development and use of electronic and allied gadgetry for effective generation, documentation, processing, storage, retrieval and use of information for maximum and speedy output (Chaturvedi, 2004). The convergence of ICT includes, commonly computer, internet, e-mail, mobile, WAP application etc. often enhance to reach penetration of ICT facilities. Information technology has been one of the most ambitious fields in the present world. Information Technology and agriculture amalgamation caused our country to regulate overall economy and trade. The country is having rapid computerization in different fields of agriculture *i.e.* from weather forecasting for crop production to protection of crop. Different information technologies like remote sensing, Expert system and database of research project, modeling techniques, different agricultural calculators and integrated management are being extensively used. After the mechanization of Indian agriculture, computerization will only support green revolution by efficient management of agricultural research. The State Agricultural Universities (SAUs) are primarily responsible for the growth and development of agriculture through their research, education and extension related activities. There are no two opinions about their important position in increasing food grain, livestock and poultry production. Since agricultural research, education and extension are the primary responsibilities of states, the growth of SAUs has to be achieved under any circumstances. With a view to fulfilling this paradigm, the faculties of SAUs are expected to be different than those of the traditional universities. They will have to work as investigators, academicians and extensionists, in short, all in one. The success of any agricultural university depends exclusively on the quality and professionalism shown by the faculty to satisfy their responsibilities to enhance the natural resources dealing with the development of mankind. They accentuate the

exploration of ideas as well as the application and dissemination of agricultural knowledge. They need to be watchful with their role as a major contributor to the economic development of our country through targeted research and the transfer of technology to the marketplace. Thus, through the integration of variety of programmes of teaching, research and extension education, they are committed to agricultural and rural development.

Information for long being recognized as an input to knowledge has acquired a new status of being a "RESOURCE" like land, capital and technology. ICT is a new field of information, till now the most of the scientists use the traditional sources of information such as magazines, journals, books, encyclopaedia, reference books, newspapers etc. for teaching, research and extension. Singh (2005) revealed that most frequently used source of agricultural information by the agriculture development officers were extension publications, training programmes, expert lectures and Kisan melas. But now a days, there is a lot of technology for these purposes such as internet, telecommunications, video conferencing, voice mail, fax, etc. and as such no study has been conducted on knowledge and use of ICT by scientists of PAU. So keeping in view, this the present study has been planned to ascertain the knowledge of scientists regarding ICT and its uses.

METHODOLOGY

The present study was conducted at Punjab Agricultural University (PAU), Ludhiana. In PAU, there are four constituent colleges, sixteen Krishi Vigyan Kendras (KVKs), Farm Advisory Service Scheme (FASS) operating in twelve districts and nine research stations. A list of the scientists, teachers and extension scientists working in all the three streams *i.e.* Teaching, Research and Extension was obtained from the Deans of constituent colleges, Directorate of Research and Directorate of Extension Education, PAU, Ludhiana. A sample of 200 research scientists, teachers and extension scientists of PAU was drawn with the help of probability proportional to size (PPS) sampling technique among which there were 17, 142 and 41 research scientists, teachers and extension scientists, respectively. For conducting the present study, a comprehensive list of different areas and sub-areas of information and communication technology was prepared by consulting the available literature and through discussion with the members of advisory committee. A questionnaire was prepared to collect the responses from the respondents about their knowledge and use of information and communication technology. The data were collected from the respondents with the help of distributed questionnaire approach. The data were analysed with the help of appropriate statistical tools such as frequencies, percentage, cumulative frequency cube root method, correlation coefficient and chi-square test.

OBSERVATION AND ANALYSIS

The results of the present study have been presented and discussed under the following headings:

Socio-personal characteristics of the respondents:

The data pertaining to distribution of the scientists according to their socio-personal characteristics (Table 1) have been given as under:

Table 1: Socio-personal characteristics of the respondents (n=200)

Sr. No.	Socio-personal characteristics	Categories	Frequency	Percentage
1.	Age (years)	29-32	33	16.5
		33-43	79	39.5
		44-56	88	44.0
2.	Designation	Professor	30	15.0
		Associate Professor	87	43.5
		Assistant Professor	83	41.5
3.	Family background	Rural	132	66.0
		Urban	68	34.0
4.	Total annual income (Lakh Rs.)	4-7	71	35.5
		7-11	83	41.5
		11-16	46	23.0
5.	Educational qualifications	M.Sc.	69	34.5
		Ph.D.	131	65.5
6.	Service experience (years)	2-6	38	19.0
		7-15	82	41.0
		16-25	80	40.0
7.	Training acquired	No training	34	17.0
		One training	77	38.5
		Two trainings	85	42.5
		More than two trainings	4	2.0

Age:

It was seen that age of the respondents varied from 29-56 years. Most of the respondents (44.0 per cent) belonged to the age group of 44-56 years, 39.5 per cent belonged to the age group of 33-43 years and the remaining 16.5 per cent respondents were in the age group of 29-32 years.

Designation:

The relatively higher proportion of respondents were Associate Professors (43.5 per cent) where as 41.5 per cent were Assistant Professors and the remaining 15.0 per cent were Professors. It can be concluded from these findings that maximum proportion of the respondents was of Associate Professors and Assistant Professors.

Family background:

The relatively higher per cent of respondents had rural background (66.0 per cent) whereas 34.0 per cent of them had urban background.

Educational qualifications:

Nearly two-third of the respondents (65.5per cent) were Ph.D. degree holders whereas 34.5 per cent of the respondents had M.Sc. degree.

Total annual income:

As many as 35.5 per cent of the respondents were in the first income group (Rs. 4-7 lakhs) and 41.5 per cent of the respondents were in the second income group (Rs. 7-11 lakhs) whereas the remaining 23.0 per cent of the respondents belonged to third income group (Rs.11-16 lakhs).

Service experience:

Nearly 41.0 per cent of the respondents had service experience between 7-15 years while 40.0 per cent respondents had 16-25 years of service experience, whereas, relatively less per cent (19.0) of the respondents had service experience of 2-6 years.

Training acquired:

Forty two and half per cent of the respondents received two trainings, while 38.5 per cent of the respondents received one training. Among all the selected respondents, more than two trainings were acquired by only 2.0 per cent, whereas 17.0 per cent of them received no training at all.

Distribution of the respondents according to the usage of ICT facilities for teaching, research and extension purposes:

It is quite clear from the data given in Table 2 that relatively higher proportion of the respondents used internet for teaching (79.5per cent), research (94.0) and extension (81.0per cent) purposes.

Majority of the respondents (90per cent) used e-mail facility for research purpose as compared to teaching (21.0 per cent) and extension (63.5 per cent) purpose. Forty-six per cent of the respondents used scanner for research purpose and 71.0 per cent of them used CD for storing data which is mostly useful for teaching purpose only. Relatively lower percentage of the respondents *i.e.* 37.5 per cent used digital camera for research work. Majority of the respondents (75.5 per cent) made use of telephone for extension purpose. It was observed that 63.0, 25.5 and 17.0 per cent of the scientists used newspapers, photographs and magazines, respectively, for extension purposes. Relatively higher percentage of the respondents used printer (54.5 per cent) and OHP (55.5per cent) for teaching purposes.

Table 2 : Distribution of the respondents according to the usage of ICT facilities for teaching, research and extension purposes (n=200)

Sr. No.	ICT Facilities	Purpose of usage*					
		Teaching		Research		Extension	
		f	%	f	%	f	%
1.	Computer	142	71.0	160	80.0	135	67.5
2.	Internet	159	79.5	188	94.0	162	81.0
3.	e-mail	42	21.0	180	90.0	127	63.5
4.	Scanner	27	13.5	92	46.0	16	8.0
5.	CD	142	71.0	43	21.5	50	25.0
6.	Digital camera	0	0.0	75	37.5	38	19.0
7.	Printer	109	54.5	86	43.0	74	37.0
8.	Television	13	6.5	25	12.5	88	44.0
9.	Telephone	0	0.0	0	0.0	151	75.5
10.	OHP	111	55.5	0	0.0	29	14.5
11.	Photographs	34	17.0	85	42.5	51	25.5
12.	Magazines	60	30.0	84	42.0	34	17.0
13.	News papers	45	22.5	59	29.5	126	63.0

* Multiple response

Extent of knowledge of the respondents about ICT:

In the present study, knowledge has been defined as body of understood information of ICT possessed by the research scientists, teachers and extension scientists. Knowledge is digested information possessed by any individual. In the acceptance of any machinery, process or media, detailed understanding or knowledge plays a key role. Many researchers have studied and found the relationship between knowledge of ICT and its realistic implementation. Finding this reality, an attempt has been made to study the various levels of knowledge in the existing study to know its role on the usage of ICT tools (Table 3).

Table 3: Distribution of the respondents according to their knowledge about ICT

Sr. No.	Knowledge	Respondents	
		Frequency	Percentage
1.	Low (Below 50.0 %)	24	12.0
2.	Medium (50-62.5%)	43	21.5
3.	High (Above 62.5%)	133	66.5
	Total	200	100

It can be observed from the data given in Table 3 that 66.5 per cent of the respondents possessed high level of knowledge about ICT, whereas 21.5 per cent of them had medium level of knowledge. Only 12.0 per cent of them possessed low level of knowledge. These findings are complimentary to those reported by Gaikwad *et al.* (2005).

Purpose of usage of ICT tools:

It is necessary to use information and communication technology by the research scientists, teachers and extension scientists for various purposes. A critical experimentation of the data given in Table 4 show that 75.0 per cent of the respondents used computer for information retrieval or data updating. Seventy four per cent of them used these technologies for data analysis. Majority of the respondents used ICT for finding the references, searching detailed information related to subjects,e-mailing, presentations, seminars, communication with other scientists, scanning and report writing. Nearly, half of them used ICT for printing of materials and entertainment. Only few respondents *i.e.* 27.5 per cent, 24.5 per cent, 19.5 per cent and 18.5 per cent used ICT for typing, data storage, making correspondence with other scientists and chatting, respectively.

Table 4: Distribution of the respondents according to different purposes of usage of ICT tools

Sr. No.	Purposes of usage	Respondents*	
		Frequency	Percentage
1.	Computer information retrieval or data updating	150	75.0
2.	Data analysis for research work	148	74.0
3.	Communication with other scientists	139	69.5
4.	For findings the references	147	73.5
5.	For searching details related to subjects	146	73.0
6.	For e-mailing	145	72.5
7.	Report writing	129	64.5
8.	Printing of materials	106	53.0
9.	Entertainment	99	49.5
10.	Seminars	140	70.0
11.	Class presentations	143	71.5
12.	For data storage	49	24.5
13.	For correspondence with other scientists	39	19.5
14.	For scanning of document	130	65.0
15.	Chatting	37	18.5
16.	Typing	55	27.5

* Multiple response

Relationship of socio-personal characteristics of the respondents with the level of knowledge of ICT:

In order to determine the relationship among the independent variables and the dependent variables, zero order correlation coefficients were worked out with continuous data and chi-squares test was applied to the discrete data.

Age and ICT:

A critical look at the figures presented in Table 5 indicate that there was negative and significant relationship between age of the scientists and their knowledge of ICT, reflecting that extent of their knowledge was observed better among young scientists than the old aged scientists. It is obvious that the young personnel in any organization have high degree of enthusiasm, eagerness and dynamism. They are ready to learn and use modern methods of communication for the development of their future carrier and they have tendency to earn high opinion for their work from their superiors as well as students and such qualities make them more active to learn new things from the different sources.

Table 5: Relationship of socio-personal characteristics of the respondents with the knowledge of ICT

Sr. No.	Socio-personal characteristics	Correlation coefficient
1.	Age (years)	-0.159*
2.	Total annual income (Lakh Rs.)	0.226 NS

* indicates significance of value at p=0.05, NS : Non-significant

Total annual income and ICT:

It can be seen from the data given in Table 5 that there was non-significant relationship between level of income of scientists and their extent of knowledge of ICT. However, positive value of coefficient of correlation indicates that level of knowledge slightly improved with the increase in their annual income, but this increase was non-significant.

Service experience and ICT:

A close examination of the data given in Table 5 reflects that there was negative and significant relationship between the service experience and the extent of knowledge of ICT of the scientists. More experience in any profession makes person more knowledge hunter because he has to satisfy the need of his juniors. However, this tendency was not up to the level of significance.

Gender and ICT:

It is obvious from the data presented in Table 6 that

Table 6: Association of socio-personal characteristics of the respondents with the knowledge of ICT

Sr. No.	Socio-personal characteristics	Category	Knowledge level			Chi-square value
			Low	Medium	High	
1.	Gender	Male	15 (7.5%)	21 (10.5%)	96 (48.0%)	9.68^{NS}
	(d.f.=2)	Female	9 (4.5%)	22 (11.0%)	37 (18.5%)	
2.	Designation	Professor	8 (4.0%)	7 (3.5%)	15 (7.5%)	
	(d.f.=4)	Associate Professor	9 (4.5%)	20 (10.0%)	58 (29.0%)	8.41*
		Assistant Professor	7 (3.5%)	16 (8.0%)	60 (30.0%)	
3.	Family background	Rural	14 (7.0%)	29 (14.5%)	89 (44.5%)	10.52*
	(d.f.=2)	Urban	10 (5.0%)	14 (7.0%)	44 (22.0%)	
4.	Father's occupation (d.f.=4)	Service	9 (4.5%)	15 (7.5%)	43 (22.5%)	
		Farming	7 (3.5%)	18 (9.0%)	47 (23.5%)	11.20^{NS}
		Business	8 (4.0%)	10 (5.0%)	43 (22.5%)	
5.	Educational qualifications	M.Sc.	13 (6.5%)	17 (8.5%)	39 (19.5%)	6.32*
	(d.f.=2)	Ph.D.	11 (5.5%)	26 (13.0%)	94 (47.0%)	
6.	Medium of instruction during	English	9 (4.5%)	19 (9.5%)	98 (49.0%)	
	school (d.f.=4)	Hindi	8 (4.0%)	13 (6.5%)	28 (14.0%)	10.37^{NS}
		Punjabi	7 (3.5%)	11 (5.5%)	7 (3.5%)	
7.	Training acquired in computer	No training	7 (3.5%)	16 (8.0%)	11 (5.5%)	
	use (d.f.=6)	One training	8 (4.0%)	14 (7.0%)	55 (27.5%)	8.78*
		Two trainings	9 (4.5%)	12 (6.0%)	64 (32.0%)	
		More than two trainings	0 (0.0%)	1 (0.5%)	3 (1.5%)	

* indicate significance of value at p=0.05, NS = Non-significant

there was non-significant association between gender of respondents and their knowledge of ICT. It is obvious that whether a respondent is male or a female, practically has no influence in acquiring and nurturing his knowledge regarding ICT.

Designation and ICT:

A perusal of the data given in Table 6 indicates that, there was a significant association between designation of scientists and their level of knowledge. It was due to the reason that Assistant or Associate Professors are more prone to the exposure of different modern ICT tools as compared to professors who have more service experience, had a more or less similar exposure to such facilities during the course of their service experience.

Family background and ICT:

A critical look at the data given in Table 6 brings to light that there was a significant association between the native place and extent of knowledge of ICT. The positive 'r' value indicates that, the level of knowledge of those scientists was better, who hailed from the urban areas. It is natural that persons who are brought up in urban areas have better contact of modern ways of means of communication and other technologies from the very early age than those of rural areas.

Father's occupation and ICT:

There was non-significant association between father's occupation of scientists and their level of knowledge. The extent of knowledge of ICT acquired by the scientists was not at all influenced by the occupation of their father whether was is doing service, farming or business.

Educational qualifications and ICT:

There was a significant association between the educational qualifications and extent of knowledge of ICT. It showed that the level of knowledge was adequate among those scientists, who had higher academic qualifications. However, this improvement was not seen up to the level of significance.

Medium of instruction during school and ICT:

It is obvious from the Table 6 that there was non-significant association between medium of instruction of scientists during school and their knowledge of ICT.

Training acquired in computer use and ICT:

There was a significant association between training acquired by the scientists and their level of knowledge. The results of training of any technology becomes visible in an individual when he understands all the technicalities of it.

Conclusion:

After a thorough scrutiny of the research findings of the present study, it can be concluded that among the various facilities available, internet accessing with an added advantage of its ready availability as compared to other ICT tools aroused keen interest among the research scientists, teachers and extension scientists with high level of knowledge for the detailed understanding of his/her related activities. The implications of this study would be helpful to the administrators of the university. The study may provide guidelines to the scientists, teachers and extension workers to plan strategies, create greater awareness about the use of ICT and promote interest about it. The study will provide guidelines to use ICT in an efficient way. For improving the present scenario of ICT, the technologies such as computers, internet, LCDs for presentation, printers, various public address equipments for disseminating the information, newspapers, and magazines should be made available by the university administration in various departments of the constituent colleges of the university with experts to give adequate knowledge about these technologies to research scientists, teachers and extension scientists.

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