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ICT Based Research Activities: Ethical Awareness & Applications by the Contemporary Researchers

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ARTICLE DETAILS	ABSTRACT
History: Accepted 10 March 2021 Available Online March 2021	<i>Research ethics are quite familiar and are followed by the researchers in all research institutes all over the world. Information and communication technologies (ICTs) are the major source of collecting, saving, analyzing and disseminating the results of these researches in all over world as well. Therefore, the major question is that whether ICT-Ethics/IT Ethics are also being followed by these researchers during their research work or not? To answer this question, a self-developed questionnaire was administered amongst the contemporary researchers of one of the main public sector University of Southern Punjab. Four factors related to ICT ethics were mainly asked in this questionnaire: Basic Understanding with ICT ethics; Grabbing Data Online; Copyright Acts and Plagiarism. Total 200 (97 male and 103 female) researchers of session 2016-18 participated in this research on the basis of their willingness. With the help of graphs, frequencies, average scores and percentages it was concluded that overall all sampled researchers' knowledge falls under the category of 'Average to Above Average' in all factors of ICT based research ethics which were specifically observed in this study. By comparing results gender-wise; it was found that both categories fall under the category of 'Below Average to Average' knowledge; but values disclosed that female researchers' knowledge was better than to male researchers.</i>
Keywords: Knowledge, ICT Ethics, Copy Right Acts, Plagiarism, Grabbing Data Online	
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1. Introduction

"Knowing" is a human natural phenomenon which shaped the concept of "Knowledge" (Vega-Encabo, 2016). In the same directions, Agarwal (2017) expressed that knowing a fact is knowledge

itself. Also Bolisani and Bratianu (2018) explained the same in the following words that: “knowing is one of the most specific human processes and knowledge is its result”. Knowledge is an essential and valuable asset of every field of our lives which is considered as an element that gradually changing our personal, organizational and social intelligent performance (Mohajan, 2017). Mohajan further expressed that there are five useful ways of knowing about a fact i.e., empirical knowing, ethical knowing, esthetic knowing, personal knowing and synthesizing knowing. Where, ‘empirical knowledge’ is knowledge acquired by observation or experimentation and leads us towards empirical research. And research is obviously considered as contribution to existing knowledge (Prethus & Munkvold: 2016).

In research, articles, abstracts, reviews, monographs, dissertations, books, newspapers, other research reports, and electronic media (Gay, Mills, & Airasian: 2015; p: 84) are the sources of existing knowledge. Linked with this, it is easy to say that modern educationists believe ICTs (Information and Communication Technologies) as a source of knowledge. The application and use of ICT to support knowledge management at higher education is currently an emerging challenge and requires a new conceptual approach and research agenda to address new challenge (Omona, Weide & Lubega, 2010). ICTs facilitated in knowledge gathering, storing and sorting inexpensively and instantaneously (Hong, Il-Hyung, Sook & Dorrie, 2015). Similarly, Joshi, Meza, Costa, Perin, Trout, and Rayamajih (2013) expressed that ICTs based tools are used to produce, store, process, distribute and exchange knowledge and information. ICTs changed the methods and values of teaching, learning and research.

ICT refers to all communication technologies, including the internet, wireless networks, cell phones, computers, software, middleware, video – conferencing, social networking, and other media applications and services enabling users to access, retrieve, store, transmit, and manipulate information in a digital form (Jo Shan Fu, 2013). ICT has contributed a lot in accelerating research and enhancing the quality of research (Marmat, 2013). Marmat further described the uses of ICT as: searching information, huge storage of data, their faster retrieval when required and processing of data with the aid of various techniques. Marmat continued and said ICT can perform many complex statistical calculations easily and quickly. The different information are made available to the researchers by computers in no time otherwise might have taken days or even months. The storage facility can make use of stored up data whenever required to do so. The results obtained from the computer are generally correct and reliable. A good research documents empowers readers to reach their own conclusion. Not limited to this, ICTs facilitates in present, share, disseminate knowledge and information at geographical distances, cost less accumulation of data and documents. Although the ICT has provided all the research facility even then the ethical practice in maintaining the quality is required in avoiding the plagiarism.

According to Polkowski (2015) Computer ethics, also known as "cyber ethics", "information ethics", "information communications technology ethics", "global information ethics" and "internet ethics" is a branch of applied ethics, deals with how computing professionals should make decisions concerning professional and social conduct. Ahmadi and Sonkar (2015) highlighted the need and importance of ICT based research ethics in following words:

“The Internet has had a drastic effect on the creation, organization, accession, and dissemination of information. More and more students and researchers are turning to the Internet for cooked solutions and shortcuts for writing assignments, research papers and

thesis. The foundation of academic and scholarly world revolves around ethics and integrity, where new ideas and theories are created, confirmed and re-confirmed, experiments and research works is carried and published for the benefits of the humanity with a genuine desire of acknowledgement. For this purpose universities and institute of higher learning are established that not only generate new ideas, theories, formulas and standards through experiments, field work and through other research methods, but also produce highly skilled and competent graduates with high standards of honesty, ethics and professionalism to serve the communities”.

The problem described above leads to a considerable need for research in this field. Therefore, based on review and synthesis of related literature, this study investigates contemporary researchers’ knowledge/understanding about ICT-ethics specifically while conducting the research or in research based activities.

The research objectives were as under.

1. To explore contemporary researchers’ knowledge/understanding regarding ICT ethics; Copy Right Acts and Plagiarism in research on the bases of their personal experiences.
2. To compare researchers knowledge/understanding on the basis of their gender.

Research questions are not the start of the research: typically they stem from the overall research purposes, objectives and design’ (Cohen, Manion, & Morrison, 2018; p:165). On the bases of discussion in the previous section; the only research question was formulated to conclude results:

Whether ICT-Ethics/IT Ethics are also being followed by the contemporary researchers during their research work or not as they follow ‘Research Ethics’ in general?

2. Research Methods and Instruments

Research methods are the detailed description of a study (Gay, Mills, Airasian: 2015; p: 115). It directs the researchers to answer a set of research questions in a study, to prove otherwise disprove a set of hypotheses. Methodologically this study employed the survey method which is the most popular method of collecting data in social sciences. And survey designs are procedures in quantitative research in which you can administer survey to a large group of people to identify trends, attitudes, opinions, behaviors or characteristics of large group of people (Creswell, 2012). Where, questionnaires are the most common and standard data collection instrument in the survey design.

2.1 Population

All the contemporarily available researches which were conducting their research during the session: 2016-18 in all disciplines and faculties of Bahauddin Zakariya University, Multan constituted population of this research.

It was quite difficult to follow the researchers from 41 different disciplines of the Bahauddin Zakariya University Multan. Therefore, the targeted population was defined and delimited in terms of their accessibility and approach. Table 3.1 showed targeted population of the delimited departments i.e., total number of registered researchers of the selected departments. The information about the currently working/registered research scholars was collected from the administration officers of each of the respective department.

Table 1: List of Target Population and Sampled Researchers

Sr. No.	Departments	Targeted Population		Sample	
		N	%	N	%
1.	Department of Education, BZU	83.00	3.50	42.00	21.00
2.	Department of English, BZU	229.00	9.68	23.00	11.50
3.	Department of Psychology, BZU	672.00	28.41	15.00	7.50
4.	Department of Sociology, BZU	76.00	3.21	23.00	11.5
5.	Department of IT, BZU	185.00	7.82	19.00	9.50
6.	Institute of Bio Tech, BZU	216.00	9.13	03.00	1.50
7.	Department of Tele Com, BZU	93.00	3.93	31.00	15.50
8.	Department of Stats, BZU	159.00	6.72	02.00	1.00
9.	Institute of Chemistry, BZU	476.00	20.12	25.00	12.5
10.	Department of Computer Science	176.00	7.44	17.00	8.50
	Total	2,365.00	100.00	200.00	100.00

2.2 Sample and Sampling Technique

As stated in the previous section that the population of this study were researchers not the common students. Researchers – as everybody knows – do not visit their respective departments regularly. Therefore, all those researchers which were present on the day of data collection in their respective disciplines were requested personally to fill in the questionnaire. These researchers were approached through their supervisors who gave information about their expected or scheduled visits to them and allowed the authors of this study to collect data from these ones. Total 374 questionnaires were distributed among the researchers and 200 (54%) were re-collected after a struggle. As per the statement, that researchers were approached personally, therefore, purposive sampling technique (Convenience Sampling) was applied to collect the required data. Table 1 showed total number of sampled researchers.

2.3 Research Instrument

Due to the unavailability of the standardized questionnaire relevant to this research, a self-developed questionnaire was designed after a brief review of the related literature. While browsing for review, authors of this study found one of the research articles of Brey (2007) entitled as ‘Understanding of Computer Ethics in Research’ which identified different types of ethical issue – helped in constructing items of the questionnaire. After reviewing; it was decided that format of these items will be based on 4 point rating scale items (e.g., True (T), Partially True (PT), Partially Wrong (PW) and Wrong (W) and were developed to save time of the respondents and also to collect a valuable amount of data.

The questionnaire was comprised of three parts. First part was related to the demographic information of the respondents (e.g., department name, gender and class). The second part of the questionnaire was designed to explore information about the practices and applications of ICT based devices by the respondents during their research work. Third and last part of this questionnaire was comprised of 50 items (i.e., initially these were 50 and later reduced to 32 after the piloting of this research instrument) based on 4 point scale (i.e., True (T)=4, Partially True (PT)=3, Partially Wrong (PW)=2 and Wrong (W)=1). This part was designed to perceive researchers’ understanding about

ICT based research ethics. The statements were combined together in 4 factors, which were grouped and entitled as: 'Understanding with Research Ethics'; 'Understating with ICT based research ethics'; 'Grabbing or Copying Data Online'; 'Copyright Acts'; and 'Plagiarism'. Each factor was analyzed demographically i.e., overall sample responses and gender wise differences between the responses of the sampled researchers.

2.4 Validation of the Research Instrument

The research instrument was validated at two different stages. At first stage; the opinion of senior professors and expert educationists were taken which were available in different public and private sector universities of Multan city. They pointed out some major problems of the tool e.g., technical terminologies used in some items of the items were required to rephrase or need explanation and to reduce the length of items of this questionnaire. As per their suggestions the necessary changes were made and then preceded for the second stage of the validation which is called piloting of the research increment. Total 10 researchers (i.e., 3 from undergraduate level; 3 from graduate level and 4 from post graduate level) were involved in piloting the research instrument. It was depicted from the questioning and responses of these researchers that some of the items were asked repeatedly and length of the instrument was quite tedious and creating hurdle in filling it completely by the respondents. Therefore, some of the items were excluded before the final administration on the bases of their ambiguity and similarity.

2.5 Research Ethics

All the heads/Chairman/Chairpersons were contacted in advance through emails and telephonic calls to get an appointment for the data collection. On the date of appointment, authors of this research visited the departments/institute personally and explain the objectives and importance of the research to them. They were ensured that their name and/or their department/institute name will be kept in secret and will never be mentioned anywhere in the research report.

3. Data and Results

According to Gravetter and Wallnau (2013) statistics are used to organize and summarize information so that the researcher can see what happened in the research study and can communicate results to others. According to this statement, frequencies, graphs and averages were used to interpret responses statistically.

From Fig.1 and Fig.2 it was found that total 103 (51%) female; 97 (49%) male and 50 (25%) researchers participated from each class/level in this study.

It was inquired from the respondents about how frequently they were using computer and internet resources during their research work. It was found from Fig. 3 that 74% (148) were totally depended on computer and internet resources; 16% (33) were frequently using and 10% (19) were utilizing the same on off-n-on bases. And no response was found under the categories of “Fairly Often” and “Often”.

Fig.3: Utilization of Computer and Internet Based Resources by the Researchers

The information regarding the knowledge and skills of basic IT resources i.e., word processing; e-data analysis; e-presentation; e-searching and e-conferencing was inquired from the respondents. It was found that 53% (126) out of 200 were able to compose their reports by themselves; 20% (48) could analyze their data through different statistical software at their own; 38% (90) were able to prepare and present their research report through MS Power Point or other software at their own; 35% (83) could search required information accurately and in short time; and 20% (39) out of 200 were able to conduct or join online research conferences.

Fig. 4: Knowledge and Skill about Fundamental IT Resources

After demographic data analysis, Part – III of the questionnaire was analyzed. Frequencies, percentages and average scores were used to analyze data of this part. Range of average scores lies between 1.00 to 4.00. Following norms were set to measure knowledge in terms of averages scores in order to conclude results:

- 1.00 to 1.50 = Poor to Below Average
- 1.60 to 2.50 = Below Average to Average
- 2.60 to 3.50 = Average to Above Average
- 3.60 to 4.00 = Above Average to Good

3.1 Factor 1: Understanding with ICT based Research Ethics

From Table 2 it was calculated that average response of overall sampled researchers was 2.72 which showed that researchers' understanding with ICT based research ethics lies between 'Average to Above the Average' because the overall average response is less than 3.00 but above 2.50. About 85% (i.e., 129+40) of the researchers believes that understanding about copy right act is very important in research ethics and 65% researchers get basic knowledge about ICT-ethics through their supervisors. The average response of statement 7 is lowest (i.e., 1.075) because 76% researchers rejected the statement which indicates their understanding with research in positive manners. But 66% (132) partially admitted that sending fake emails to others is a joyful activity for them.

Table 2: Overall Sampled Researchers Responses Regarding the ICT-Ethics

Seq.	Statements in Sequence	Scale				Avg.
		T	PT	PW	W	
1.	Before starting research work, my supervisor discussed and shared knowledge about ICT ethics.	82	47	66	05	3.030
3.	Understanding about 'Copy right Act' is important for all researchers.	129	40	24	07	3.455
5.	Reproducing or replicating a research is ethically right.	29	136	28	06	2.930
7.	Accessing personal data and information about others through internet without permission is not unethical.	07	00	36	115	1.075
11.	Sending fake emails to others is a joyful activity for me.	18	132	38	12	2.780
12.	Research ethics are difficult to follow while collecting data.	25	127	40	08	2.845
29	Pay someone to write a research report for you is ethically right.	39	114	40	07	2.925

Table 3 compared the understating level of ICT based research ethics between male and female researchers it was calculated that the average response of overall male researchers was 1.465

and female researchers gotten 1.518 in this regard (i.e., Table 3). Both averages were below 2.00 which reflected 'Below the Average' understanding with ICT based research ethics of both categories. By comparing the values (i.e., frequencies and averages) individually statement wise, we can see that female researchers' understanding is 'to some extent' better than to male researchers.

Table 3: Male and Female Researchers Responses Regarding the ICT-Ethics

Statement Seq. No.	Male Researchers				Avg.	Female Researchers				Avg.
	T	PT	PW	W		T	PT	PW	W	
1.	44	20	32	01	1.51	38	27	34	04	1.53
3.	62	26	07	02	1.71	67	14	17	05	1.75
5.	14	69	11	03	1.44	15	67	18	03	1.50
7.	15	58	19	05	1.39	21	57	23	02	1.52
11.	11	64	20	02	1.39	07	68	18	10	1.39
12.	12	63	19	03	1.39	13	64	21	05	1.46
29.	19	59	15	04	1.44	20	55	25	03	1.49

3.2 Factor 2: Grabbing or Copying Data Online

The factor 2 measures researchers understanding about snatching or copying file and data from any electronic sources with or without permission. It was reflected from the calculated average response (3.33) of overall researchers that the attitude of overall sampled researchers was positive in this factor and lies between 'Average to Above Average' because the calculated values lies between 3.00 to 3.50. An overwhelming majority of researchers i.e., 87% were against in grabbing data of others research work and 85% rejected statement 24 strongly.

Table 4: Overall Sampled Researchers Responses Regarding Grabbing or Copying Data Online With or Without Permission

Seq.	Statements in Sequence	Scale				Avg.
		T	PT	PW	W	
8.	Grabbing survey data of those researchers whose research work resembles to me.	17	09	41	133	3.45
13.	Snooping around in other's computer screens to collect information about their work.	20	13	46	121	3.34
14.	Stealing assignment of a friend from an electronic source.	24	03	45	128	3.39
24.	Copying text from an electronic source of another researcher.	18	12	39	131	3.42
25.	Submit research report as an individual while it is done in group.	32	02	51	115	3.25
26.	Submit research report as a group while it is done by an individual.	41	10	55	94	3.01

Table 5 compared responses of the sampled researchers gender-wise regarding Factor 2 of the questionnaire. It was found from the calculated values of the sampled researchers that both of

these categories (male average = 1.64 and female average = 1.67) lies between 'Below Average to Average' because the averages responses were 1.50 to 2.00. No significant differences were found between the responses in terms of frequencies and/or averages in Table 5 but female response were better 'to some extent' than to male responses.

Table 5: Male and Female Researchers Responses Regarding Grabbing or Copying Data Online With or Without Permission

Seq.	Male Researchers				Avg.	Female Researchers				Avg.
	T	PT	PW	W		T	PT	PW	W	
8.	09	03	20	65	1.68	08	06	21	68	1.78
13.	07	04	24	62	1.68	13	09	22	59	1.67
14.	06	02	20	69	1.73	18	01	25	59	1.66
24.	07	04	21	65	1.69	11	08	18	66	1.73
25.	13	00	25	59	1.62	19	02	26	56	1.63
26.	24	02	25	46	1.44	17	08	30	48	1.58

3.3 Factor 3: Copyright Acts

Copyright give the author of any research or creative work an exclusive right to reproduce the work in any form (Ahmadi, & Sonkar, 2015). It is a form of protection provided by the laws of the United States (Title 17, US Code 1976) to creators of original works or authorship or expression (Charbonneau & Priehs, 2014). To measure the understanding level of sampled researchers regarding copyright acts, this factor was included, specifically. The average response of overall sampled researchers was 3.17 which fall under the category of 'Average to Above Average' because the range of calculated average lies 3.00 to 3.50. An overwhelming majority of the sampled researchers i.e., 85% strongly rejected for the use of unauthorized computer resources and 81% for proprietary software usage. Simple majority of the sampled researchers i.e., 40% expressed that pirated software are legally right to use while 53% simply disagreed with the statement. Similarly, 26% of the researchers believe that copying restricted paid content from different online resources is ethically right while 46% simply disagreed with the given statement.

Table 6: Overall Sampled Researchers' Awareness Regarding Copy Right Acts

Seq.	Statements in Sequence	Scale				Avg.
		T	PT	PW	W	
9.	Copying restricted paid content from different online resources is fairly right activity in research.	10	41	93	56	2.98
15.	Using proprietary software which has not been paid.	26	13	38	123	3.29
16.	Using computer resources without authorization or permission.	18	13	42	127	3.39
30.	Pirated software usage is not an illegal activity.	45	35	106	14	2.54
31.	Using university's resources for non-research activities.	34	06	46	114	3.20
32.	Using university's resources for entertainment.	42	10	34	114	3.10

Table 7 compared results of male and female researchers regarding the understanding with copy right acts. The average response of male researchers was 1.51 and females scored 1.61 which fall under the category of 'Below Average to Average' because the calculated averages were in the range of 1.50 to 2.00. Again the female researchers' responses were favorably more ethical than to male researchers.

Table 7: Male and Female Researchers Responses Regarding Copy Right Acts

Seq.	Male Researchers				Avg.	Female Researchers				Avg.
	T	PT	PW	W		T	PT	PW	W	
9.	02	19	47	29	1.49	08	22	46	27	1.49
15.	15	06	20	56	1.56	11	07	18	67	1.74
16.	12	08	21	56	1.58	06	05	21	71	1.82
30.	04	26	47	20	1.39	10	19	59	15	1.43
31.	15	03	19	60	1.59	19	03	27	54	1.61
32.	22	03	17	55	1.50	20	07	17	59	1.61

3.4 Factor 4: Plagiarism

The world plagiarism derived from the word 'plagiaries' means kidnaper and it is an act of fraud in literature (Ahmadi & Sonkar, 2015). From table 8 it was depicted that overall sampled researchers' understanding with plagiarism rules was highly positive because the calculated average was 3.36 and fall under the category of 'Average to Above Average'. Total 100% researchers rejected statement 27 and this was the only item whose average falls in the range of 3.50 to 4.00. Moreover, an overwhelming majority of sampled researchers rejected statements 22 (83%) and 23 (86%).

Table 8: Overall Sampled Researchers' Awareness Regarding Plagiarism

Seq.	Statements in Sequence	Scale				Avg.
		T	PT	PW	W	
17.	Using people's intellectual output without referring them.	23	11	49	117	3.30
21.	Copying word by word from journal without acknowledgement.	41	10	36	113	3.11
22.	Copying exact text of an author without quotation marks.	22	14	29	135	3.39
23.	Paraphrasing text without acknowledgement.	20	07	46	126	3.38
27.	Purchasing an online research paper for the support of your research.	159	41	00	00	3.80
28.	Purchasing an online paper and submitting it as it is yours own.	36	08	32	124	3.22

By comparing sampled researchers' responses gender-wise, it was depicted from Table 9 that the average response of male researchers was 1.66 and female researchers secured 1.70 which falls under the category of 'Below Average to Average' understanding. If we compare data statement-wise we can observe that female research scholars' responses were more positively inclined towards

ethics as compared to male research scholars specifically in statements 17, and 27 respectively but male researchers were better than to females in statements 22 and 23 respectively.

Table 9: Male and Female Researchers Responses Regarding Plagiarism

Seq.	Male Researchers				Avg.	Female Researchers				Avg.
	T	PT	PW	W		T	PT	PW	W	
17.	12	05	24	56	1.59	11	06	25	61	1.71
21.	20	04	16	57	1.52	21	06	20	56	1.59
22.	08	02	17	70	1.72	14	12	12	65	1.67
23.	05	03	22	66	1.71	15	4	24	60	1.68
27.	81	15	00	00	1.85	78	25	00	00	1.94
28.	16	03	14	64	1.60	20	05	18	60	1.62

4. Discussion and Conclusion

From the above results it was found that computer and internet resources were mostly being used by all researchers throughout their research work, good majority of them is highly dependent on these resources while simple majority can compose their documents at their own and they can prepare and present their presentations through multimedia and/or online research based conferences. Majority of the researchers have a good knowledge and experience of online data analysis through different statistical data analysis packages and even doing computer programming for research purposes. Maximum of the contemporary researchers were using Google Scholar, MS Word, MS Excel, SPSS and Emails during their research work.

Overall researchers' responses showed that they have 'Average to Above Average' knowledge or information regarding all the four factors observed in this study. By comparing the calculated average values it was concluded that overall researchers' highest understanding was with plagiarism rules and ethics (i.e., 3.36); second highest level of understanding was about grabbing or copying data online (i.e., 3.33); third level of understanding was about copyright acts (i.e., 3.17) and lowest knowledge was about general understanding with ICT ethics (i.e., 2.72).

Trucano (2005) expressed that 'uses of ICTs in education in many cases to be affected by the gender of the learner'. But regarding this study, while comparing male and female knowledge or understanding – it was concluded that both categories falls in the range of 'Below Average to Average' knowledge or understanding. No significant difference of understanding was found in any of the factors observed in this study but comparatively female responses were more positive as compared to male responses. Highest response rate of female researchers were found in Factor 4 i.e., plagiarism and lowest in basic understanding with ICT ethics. Similar ratios were found in case of male responses.

Finally it was concluded that researchers' knowledge or understanding with overall ICT ethics – specifically in the field of research – was not highly appreciable. They were following ICT based ethical rules in plagiarism; other factors are ignored or not being seriously followed by the researchers. Therefore, they need more trainings and workshops to improve their knowledge and understanding and/or to follow ICT ethics. It is recommended at the end of this research that researchers from different universities should be included to compare the results; moreover, including more factors about ICT ethics may be helpful in studying these factors deeply.

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