Usage of ICT Tools and Services Among Ophthalmologists: An Opinion Survey

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Abstract

Information communication technology (ICT) is one of the major drives for the development and progress of the information society. It has created a huge impact in all sectors like health, education, work, family, entertainment etc. In health sector, particularly in the ophthalmology sector, ICT tools for information access and use plays a significant role and nurtures the ophthalmologists' profession. The present paper aims to study the usage of ICT tools and services among the ophthalmologists, i.e. eye doctors. Through convenient sampling method, a structured questionnaire is circulated to the ophthalmologists in India and 633 ophthalmologists responded. Among the ICT tools user 633 ophthalmologists, male users constitute 53.55% while female users constitute 46.45%. 34.28% of the users are less than or equal to the age of 30. 47.08% users' age is between 31 and 40; 14.06% users' age is between 41 and 50; 3.32% users' age is between 51 and 60; and 1.26% users' age is 61 and above. Majority of the users are within the age group 31 to 40. 57.66% respondents are working as a medical officer or medical consultant or hospital management staff. 40.13% respondents are undergoing training in specialty clinics and serving eye patients.

Keywords: Usage of ICT Tools, ICT, Ophthalmologists

Introduction

In an information society, the creation, distribution, uses, and manipulation of information are significant economic, political, and cultural activities. Information communication technology (ICT) is one of the major drives for development and progress of the information society. ICT empowers the society with abundant technological tools and service, which helps to access, store, manipulate, use, share and exchange the information instantly without any geographical or time constraints. This has created a huge impact in all sectors like health, education, work, family, entertainment, etc.

In health sector, particularly in the ophthalmology sector, ICT tools and services play a crucial role. The ICT tools and services for tele-ophthalmology enable timely diagnosis without any geographical barrier or availability of the trained professionals in that particular region. This has changed the nature of interaction between individuals and professionals, in particular the ophthalmologists. It also increases access to information, peer-information exchange, awareness about eye care services, and demand for specialised eye care services in the society. ICT tools also nurtures the ophthalmology field by providing instant access to quality resources in different formats for a better evidence-based practice. It also empowers the ophthalmologists to be up-to-date, exchange the best practices, and share innovative ideas. ICT tools play a significant role and create a significant impact in the ophthalmology field, eye care system & services, eye care providers, and the society.

This paper aims to study the usage of ICT tools and services among the ophthalmologists or eye doctors. A survey method is used to obtain the ophthalmologists' usage of the ICT tools and services. This study is a part of the study "Information Needs, Sources and Seeking Behaviour of Ophthalmologists in Academic Eye Hospitals in India".

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Table 1: Notable ICT Tools and Services

Software to access/ store/ use information	*Social media sites*	*Applications to organise/ store information online*	*Video conferencing applications*
e-Mail	Facebook	Dropbox	Skype
Multimedia	Blogs	Google Drive	Google Hangouts
e-learning	Youtube	One Drive	Scopia
Mobile apps	Twitter	Evernote	Vsee
Presentation	LinkedIn	Notability	Facebook Live
Spreadsheets	Interest	Amazon Cloud Drive	Uber Conference
	Google Plus+	Box	Zoho Meeting
	Tumblr		Webex
	Instagram		Click Meeting
	Reddit		Goto Meeting
	Ask.com		Vibre
	Flickr		WhatsApp Call
	Vine		
	Meetup		
	Classmates		

Review of Literature

Lindroos and Pinkhasov (2003) discussed about the "Information Society: The ICT challenge". They explained that the information technologies offer great potential for the world economy and society. But, several challenges and risk must be overcome on the way.

Ricur (2009) examined the impact of ICTs in ophthalmology and more particularly on physician's communication and daily training, high quality eye care services regardless of the geographic barriers of physicians. She discussed about how Zaldivar Institute implemented the videoconferencing and voice over IP (VoIP) technologies to optimise not only communication among its medical staff and patients at different institutional branches, but also as an educational and training tool for physicians taking part in the Ophthalmology Residency Program, as well as contributing with the protection of our environment. She also mentioned about the daily use of Skype™ and Spark® as instantaneous communication tools among colleagues or technical or administrative staff for specific consultations in order to solve difficulties or simply to share information.

The authors of this paper was not able to find any studies on ICT tools and services usage particularly among the ophthalmologists in India, which leads to this study. The main aim of the study is to get more insights about the usage of ICT tools and services among the ophthalmologists.

Research Questions

1. To identify the usage pattern of the technological devices.
2. To find out the preference and usage of ICT tools and services among the ophthalmologists.
3. To examine whether the preference and usage of ICT tools and service is significant for both male and female ophthalmologists, and ophthalmologists of different age groups, working positions, working experience.

Objectives of the Study

1. To identify the usage pattern of the technological devices.
2. To find out the software used by the ophthalmologists to access/ store/ use information.

3. To identify the online ICT tools and services used by the ophthalmologists for information organising and storage.
4. To find out the social media sites used by the ophthalmologists for information sharing.
5. To identify the video conferencing applications/ software used by ophthalmologists for information sharing.
6. To examine the usage of ICT tools and services on the parameter of gender, age, designation and experience.

Hypotheses of the Study

1. There is no significant difference between the ICT tools and services usage with respect to gender.
2. There is no significant difference between the ICT tools and services usage with respect to age group.
3. There is no significant difference between the ICT tools and services usage with respect to designation.
4. There is no significant difference between the ICT tools and services usage with respect to working experience.

Methodology

This study aims to find out the usage of ICT tools among ophthalmologists. Through convenient sampling method, a structured questionnaire were circulated among ophthalmologists in India, out of which 633 ophthalmologists responded. The ophthalmologists are asked to record all the notable ICT tools (referred in Table 1) they are using. Data collected was organised using Ms-Excel and analysed through SPSS 18 PAW Statistics software. To examine whether there is any mean difference between two groups, t-test is used. ANOVA test is used to find out whether there is any mean difference between more than two groups. P-value less than 0.05 is considered to be statistically significant.

Important Terminologies

Ophthalmologists: Doctors who completed MBBS and any ophthalmology degree like Master of Surgery (MS), Diploma of Ophthalmology (DO), Doctor of Medicine (MD), Diplomate of National Board in Ophthalmology (DNB).

Analysis and Interpretation

The ophthalmologists' (respondents') demographic details are shown in Table 2. A total of 633 ophthalmologists are included in this study.

Table 2: Ophthalmologists Demographics

S. No.	*Characteristic*	*No. of Respondent*	*Percentage*
I	**Gender**		
1	Male	339	53.55
2	Female	294	46.45
II	**Age group**		
1	Less than or equal to 30	217	34.28
2	31 to 40	298	47.08
3	41 to 50	89	14.06
4	51 to 60	21	3.32
5	61 and above	8	1.26
III	**Designation Category**		
1	Medical Officer / Medical Consultant / Management Staff	365	57.66
2	Fellows	254	40.13
3	Senior Residents	14	2.21
IV	**Experience**		
1	Less than or equal to 5 years	411	64.93
2	6 to 10 years	121	19.12
3	11 to 15 years	40	6.32
4	16 to 20 years	30	4.74
5	21 years and above	31	4.90
	Total	633	

As per Table 2, among the 633 ophthalmologists, 294 are female, 339 are male. Majority of respondents are male. The male respondents are 53.55% and female respondents are 46.45%. 34.28% respondents are less than or equal to age 30. 47.08% respondents' age is between 31 and 40; 14.06% respondents' age is between 41 and 50; 3.32% respondents' age is between 51 and 60; and 1.26% respondents' age is 61 and above. Majority of the respondents are within the age group 31 to 40. 57.66% respondents are working as a medical officer or medical consultant or are managing the hospital. 40.13% of the respondents are undergoing training in specialty clinics and serving eye patients. 2.21% of

the respondents are undergoing training in advanced techniques of ophthalmology and serving eye patients. 64.93% respondents have working experience of less than or equal to 5 years. 19.12% ophthalmologists have 6 to 10 years' experience; 6.32% ophthalmologists have 11 to 15 years' experience; 4.74% ophthalmologists have 16 to 20 years' experience; while 4.90% ophthalmologists have an experience of 21 years and above.

Table 3: Usage of Technological Devices among Ophthalmologists

S. No.	Technological device	Daily	Twice within a week	Weekly	Fortnightly	Monthly	Occasionally
1	Computer Desktop	278 (43.9%)	71 (11.2%)	58 (9.2%)	24 (3.8%)	20 (3.2%)	182 (28.8%)
2	Laptop	459 (72.5%)	98 (15.5%)	35 (5.5%)	12 (1.9%)	13 (2.1%)	16 (2.5%)
3	Mobile/ Smartphone	601 (94.9%)	8 (1.3%)	6 (0.9%)	4 (0.6%)	3 (0.5%)	11 (1.7%)
	Total	1338 (70.5%)	177 (9.3%)	99 (5.2%)	40 (2.1%)	36 (1.9%)	209 (11.0%)

Table 3 indicates frequency of usage of technological devices among ophthalmologists. It shows that 43.9% ophthalmologists are using computer desktops daily, 72.5% ophthalmologists are using laptops daily, and 94.9% ophthalmologists are using mobile/ smartphone daily. Mobile/ smartphone is the most popular technological device among the ophthalmologists. On total 70.5% ophthalmologists are using the technological devices daily.

Table 4: Popularity of Software to Access/ Store/ Use Information among Ophthalmologists

S. No.	Application	No. of Respondent	Percentage	Rank
1	e-mail	545	86.10	1
2	Presentation	359	56.71	2
3	Mobile apps	264	41.71	3
4	e-learning	241	38.07	4
5	Multimedia	227	35.86	5
6	Spreadsheets	102	16.11	6

Table 4 shows the popularity of software among ophthalmologists. To find out the popularity of the software to access/ store/ use information among ophthalmologists, each application is ranked by the total number of users. The result shows up that e-mail software with 545 users is holding the first rank and is more popular among the ophthalmologists. The presentation software secures the second rank with 359 users and mobile apps secure the third rank with 264 users. The e-learning, multimedia, spreadsheet software are securing the ranks 4, 5 and 6 respectively.

Table 5: Popularity of Social Media Sites among Ophthalmologist

S. No.	Social Media	No. of Respondent	Percentage	Rank
1	Facebook	420	66.35	1
2	YouTube	359	56.71	2
3	Google Plus	171	27.01	3
4	LinkedIn	142	22.43	4
5	Twitter	80	12.64	5
6	Blogs	79	12.48	6
7	Instagram	71	11.22	7
8	Classmates	45	7.11	8
9	Interest	34	5.37	9
10	Ask.com	22	3.48	10
11	Flickr	13	2.05	11
12	Meetup	12	1.90	12
13	Tumblr	11	1.74	13
14	Reddit	7	1.11	14
15	Vine	4	0.63	15

Table 5 depicts the results about popularity of social media, derived from the ophthalmologists' responses. To find out the popularity of the social media sites for information sharing among ophthalmologists, each site is ranked by the total no. of users. The result shows up that Facebook with 420 users is holding the first rank and

is more popular among the ophthalmologists. YouTube secures the second rank with 359 users and Google Plus secures the third rank with 171 users. The sites LinkedIn, Twitter, blogs, Instagram, Classmates, Interest, Ask.com, Flickr, Meetup, Tumblr, Reddit, Vine are securing the ranks 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15 respectively.

Table 6: Popularity of Online Information Organising/ Storage Applications among Ophthalmologist

S. No.	*Applications to Organise/ Store Information Online*	*No. of Respondent*	*Percentage*	*Rank*
1	Google Drive	445	70.30	1
2	Dropbox	284	44.87	2
3	One Drive	113	17.85	3
4	Evernote	58	9.16	4
5	Box	36	5.69	5
6	Amazon Cloud Drive	24	3.79	6
7	Notability	8	1.26	7

Table 6 shows the popularity of online applications to organise/ store information among ophthalmologists. Each application is ranked by the total no. of users. The result shows up that Google Drive with 445 users is holding the first rank and is the most popular among the ophthalmologists. The Dropbox secures the second rank with 284 users and One Drive secures the third rank with 113 users. Evernote, Box, Amazon Cloud Drive, Notability applications are securing the ranks 4, 5, 6 and 7 respectively.

Table 7: Popularity of Video Conferencing Applications among Ophthalmologist

S. No	*Video conferencing application*	*No. of Respondent*	*Percentage*	*Rank*
1	WhatsApp Call	362	57.19	1
2	Skype	349	55.13	2
3	Google Hangout	110	17.38	3
4	Facebook Live	97	15.32	4
5	Scopia	58	9.16	5
6	Vibre	48	7.58	6
7	Webex	12	1.90	7
8	Goto Meeting	12	1.90	8
9	Vsee	10	1.58	9
10	Uber Conference	8	1.26	10
11	Zoho Meeting	7	1.11	11
12	Click Meeting	6	0.95	12

Table 7 states the popularity of the videoconferencing applications among ophthalmologists; each application is ranked by the total no. of users. The result shows up that WhatsApp call with 362 users is holding the first rank and is the most popular among the ophthalmologists. Skype secures the second rank with 349 users and Google Hangout secures the third rank with 110 users. Facebook Live, Scopia, Vibre, Webex, Goto Meeting, Vsee, Uber Conference, Zoho Meeting, Click Meeting applications are securing the ranks 4, 5, 6, 7, 8, 9, 10, 11, and 12 respectively.

Testing the Hypotheses

Table 8 displays the ICT tools usage of ophthalmologists by gender, age, designation category and working experience. The response of frequency of using the technological device usage (computer desktop, laptop, mobile/ smartphone) is coded as Daily-1, Twice within a week-2, Weekly-3, Fortnightly-4, Monthly-5, Occasionally-6 and summed to find the technological device usage score. The response of dichotomous variable of each software to access/ store/ use information is summed up to find the software usages core. The response of dichotomous variable of each social media site is summed up to find the social media usage score. The response of dichotomous variable of each application to organise/ store information online is summed up to find the online store usage score. The response of dichotomous variable of each videoconferencing software is summed up to find the video software usage score.

Table 8: ANOVA Test for the ICT Tools and Services Usage with respect to Gender

Usage	Count	Technological device		Software to access/ store/ use information		Social media sites		Applications to organise/ store information online		Video conferencing applications	
		Mean SD	P value F Score	Mean SD	P value F Score	Mean SD	P value F Score	Mean SD	P value F Score	Mean SD	P value F Score
Gender			0.242		0.121		0.899		0.001**		0.527
			1.374		2.415		0.016		11.1		0.401
Male	339	5.34		2.9		2.35		1.62		1.12	
		2.841		1.499		1.563		0.867		0.9	
Female	294	6.03		2.57		2.29		1.43		0.94	
		2.907		1.37		1.617		0.711		0.855	

Hypothesis 1: There is no significant difference between the ICT tools and services usage with respect to gender.

The usage score is verified statistically with t-test to find out if there is any significant difference between the usage scores with respect to gender. The calculated technological device usage score P values (0.242) shows that there is no significant difference between usage of technological devices by male and female ophthalmologists. The calculated software usage score P value (0.121) shows that there is no significant difference in usage of software to access/ store/ use information by male and female ophthalmologists. The calculated social media usage score P value (0.899) shows that there is no significant difference in usage of social media sties by male and female ophthalmologists. The calculated online store usage score P value (0.001) shows that there is a significant difference in usage of applications to organise/ store information online by male and female ophthalmologists. The calculated video software usage score P value (0.527) shows that there is no significant difference in usage of video conferencing application by male and female ophthalmologists. Among the five variables, applications to organise / store information online is identified as significant, while remaining variables are not significant. Hence, the hypothesis is partially proved.

Table 9: ANOVA Test for the ICT Tools and Services Usage with Respect to Age Group

Usage	Count	Technological device		Software to access/ store/ use information		Social media sites		Applications to organise/ store information online		Video conferencing applications	
		Mean SD	P value F Score	Mean SD	P value F Score	Mean SD	P value F Score	Mean SD	P value F Score	Mean SD	P value F Score
Age			0.372		0.211		0.009**		0.337		0.507
			1.068		1.466		3.395		1.139		0.829
Less than or equal to 30	217	5.71		2.66		2.51		1.51		1.05	
		2.712		1.368		1.564		0.746		0.888	
31 to 40	298	5.7		2.82		2.34		0.846		1.08	
		2.809		1.479		1.677		0.049		0.897	
41 to 50	89	5.26		2.85		2.08		0.089		0.94	
		3.021		1.519		1.408		1.28		0.884	
51 to 60	21	5.76		2.33		1.52		0.148		0.81	
		3.223		1.494		0.928		1.12		0.68	
61 and above	8	7.25		2		1.38		0.125		0.88	
		6.563		1.309		0.744		0.83		0.641	

Hypothesis 2: There is no significant difference between the ICT tools and services usage with respect to gender.

ANOVA test is used to verify if there is any significant difference between the usage scores with respect to age groups. The calculated technological device usage score P values (0.372) show that there is no significant difference between usage of technological devices by all the age groups of ophthalmologists. The calculated software usage score P value (0.211) shows that there is no significant difference between usage of software to access/ store/ use information by all the age groups of ophthalmologists. The calculated social media usage score P value (0.009) shows that there is a significant difference between usage of social media sites by all the age groups of ophthalmologists. The calculated online store usage score P value (0.337) shows that there is no significant difference between usage of applications to organise/ store information online by all the age groups of ophthalmologists. The calculated video software usage score P value (0.507) shows that there is no significant difference between usage of videoconferencing application by all the age groups of ophthalmologists. Among the five variables, 'social media sites' is identified as significant while remaining variables are not significant. Hence, the hypothesis is partially proved.

Table 10: ANOVA Test for the ICT Tools and Services Usage with Respect to Designation

Usage	*Count*	*Technological device*		*Software to access/ store/ use information*		*Social media sites*		**Applications to organise/ store information online**		**Video conferencing applications**		
		Mean SD	*P value F Score*	*Mean SD*	*P value F Score*	*Mean SD*	*P value F Score*	*Mean SD*	*P value F Score*	*Mean SD*	*P value F Score*	
Designation			0.584		0.426		0.01**		0.742		0.047**	
			0.539		0.854		4.682		0.298		3.065	
Medical Officer / Medical Consultant / Management Staff	365	5.75		2.7		2.19		1.52		0.97		
		3.062		1.413		1.508		0.807		0.877		
Fellows	254	5.52		2.83		2.47		1.56		1.14		
		2.627		1.501		1.614		0.802		0.887		
Senior Residents	14	5.86		2.5		3.21		1.43		0.86		
		2.931		1.401		2.517		0.756		0.864		

Hypothesis 3: There is no significant difference between the ICT tools and services usage with respect to designation.

ANOVA test is used to verify if there is any significant difference between the usage scores with respect to designation category. The calculated technological device usage score P values (0.584) shows that there is no significant difference between usage of technological devices with respect to designation category of ophthalmologists. The calculated software usage score P value (0.426) shows that there is no significant difference between usage of software to access/ store/ use information with respect to designation category of ophthalmologists. The calculated social media usage score P value (0.001) shows that there is a significant difference between usage of social media sties with respect to designation category of ophthalmologists. The calculated online store usage score P value (0.742) shows that there is no significant difference between usage of applications to organise/ store information online with respect to designation category of ophthalmologists. The calculated video software usage score P value (0.047) shows that there is a significant difference between usage of videoconferencing application with respect to designation category of ophthalmologists. Among the five variables, 'social media sites' & 'videoconferencing applications' are identified as significant while remaining variables are not significant. Hence, the hypothesis is partially proved.

Table 11: ANOVA Test for the ICT Tools and Services Usage with Respect to Working Experience

Usage	*Count*	*Technological device*		*Software to access/ store/ use information*		*Social media sites*		*Applications to organise/ store information online*		*Video conferencing applications*	
		Mean SD	*P value F Score*	*Mean SD*	*P value F Score*	*Mean SD*	*P value F Score*	*Mean SD*	*P value F Score*	*Mean SD*	*P value F Score*
Experience			0.146		0.115		0.008**		0.011**		0.024**
			1.71		1.864		3.456		3.275		2.839
Less than or equal to 5	411	5.67		2.72		2.38		1.49		1.03	
		2.7		1.427		1.58		0.747		0.866	
6 to 10	121	5.64		2.86		2.5		1.75		1.21	
		3.09		1.451		1.808		0.977		0.95	
11 to 15	40	5.75		2.95		2.08		1.45		0.78	
		2.968		1.663		1.439		0.846		0.974	
16 to 20	30	4.6		2.97		2		1.53		1	
		2.444		1.542		1.203		0.776		0.788	
21 and above	31	6.52		2.16		1.45		1.32		0.77	
		4.366		1.241		0.81		0.599		0.669	

Hypothesis 4: There is no significant difference between the ICT tools and services usage with respect to working experience.

ANOVA test is used to verify if there is any significant difference between the usage scores with respect to working experience. The calculated technological device usage score P value (0.146) shows that there is no significant difference between usage of technological devices with respect to working experience of ophthalmologists. The calculated software usage score P value (0.115) shows that there is no significant difference between usage of software to access/ store/ use information with respect to working experience of ophthalmologists. The calculated social media usage score P value (0.008) shows that there is a significant difference between usage of social media sties with respect to working experience of ophthalmologists. The calculated online store usage score P value (0.011) shows that there is a significant difference between usage of applications to organise/ store information online with respect to working experience of ophthalmologists. The calculated video software usage score P value (0.024) shows that there is a significant difference between usage of videoconferencing applications with respect to working experience of ophthalmologists. Among the five variables, 'social media sites', 'videoconferencing applications' & 'applications to organise/ store information online' are identified as significant while remaining variables are not significant. Hence, the hypothesis is partially proved.

Conclusion

The study shows results about usage of ICT tools among ophthalmologists. Mobile/ smartphone is the most popular technological device among the ophthalmologists. Facebook is the most popular social media among ophthalmologists, followed by WhatsApp call for videoconferencing. The statistical tests show that there is no significant difference between usage of technological devices by male and female ophthalmologists and by different age groups, designation categories, or working experience. The statistical tests show that there is no significant difference between usage of software to access/ store/ use information by male and female ophthalmologists and of different age groups, designation categories, working experience. The statistical tests show that there is a significant difference between usage of social media sites by ophthalmologists of different age groups, designation categories, working experience. The statistical tests show that there is a significant difference between usage of applications to organise/ store

information online by male and female ophthalmologists and ophthalmologists of different working experience. The statistical tests show that there is a significant difference between usage of videoconferencing applications by ophthalmologists of different designation categories and working experience.

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