Perceptions, attitudes and practices of information and communication technology use in health related research among the health sciences faculty members in medical universities in southern China

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Abstract

Background Information and communication technology (ICT) has been widely used in medical education as well as biomedical and population based research, however, the use of ICT in China is still insufficient. This study aimed to investigate the use, perceptions and attitudes of ICT use in biomedical and population based research among faculty members in medical universities in southern China. Methods A cross-sectional study was conducted among faculty members working in the health sciences discipline in 6 major universities in southern China. A self-completed online questionnaire was used for data collection. Findings Of 270 faculty members enrolled, 206 faculties (76%) used ICT in their work and 54% were female. Few faculty members took an online course or were trained on ICT use before. The ICT-using group was more experienced than the ICT-free group (P= 0.047). The most frequently used ICT tools were mobile phone, the Internet, non-mobile computer system, WeChat (similar to Facebook - a popular social communication tool in China) and QQ (a popular chat tool in China). The use of non-mobile computer systems, WeChat and QQ in ICT-using group was more frequent than in ICT-free group (P<0.05). The attitudes towards the use of ICT in professional work varied between two groups, mainly on the practicability of ICT; the best way to reach their universities with an ICT related training program was introducing the successful examples of ICT used by faculties. Conclusions This study suggests that faculty members from medical universities in southern China use ICT commonly, but they lack in-depth understanding of ICT use. The findings also demonstrate the shallow perception and positive attitude of ICT use among faculty members and highlight an urgent need for an ICT training course to promote the learning and teaching environment in most medical universities in China.

Background

Information and communication technology (ICT) is a set of information technologies that enable users to process, store and transmit information, and can facilitate the process of information-related activities[1]. In recent decades, the application of ICT tools in the research and training of health sciences has rapidly grown worldwide, including developed countries and developing countries [2, 3], and ICT has been adopted in fields of healthcare and health research, contributing to a great convenience for the public and business sectors, as well as medical professionals[4, 5]. Furthermore, the use of ICT can promote research collaboration, and enable researchers to increase access to training through online and distance learning tools [6, 7]. To date, the use of ICT has brought tremendous benefits to biomedical and population-based researches [8-10].

In developed countries, great advances have been made in the application of ICT for healthcare [2], while ICT utilization in health research is still limited in developing countries [3].In most developed countries, the governments imbedded ICT use of health research and educational systems in national strategies to promote the application of ICT [11]. However, the capacity to use ICT and access to ICT resources in developing countries remains weak, and the imbalance in the capacity between developed and

developing countries would continue to expand. Since the problems, needs and stages are different between developed and developing countries, an in-depth understanding of the current challenges and opportunities in the use of ICT is crucial in developing countries to expand ICT utilization, especially in China, which is one of the largest developing countries in the world[12].

ICT is gradually becoming an integral part of the learning and teaching environment in most medical schools, and has translated some important theories on student learning into reality in professional settings [5]. Additionally, for the faculty members involved in education and research, grasping ICT skills has been identified as a key and challenging step in long-term global health research[13, 14], and they are often required to change the technologies in the teaching process. Moreover, the promotion of ICT can help faculty members to better accept the changes and needs brought by new technologies. Several studies suggest that although ICT is adopted in many teaching sessions, such as online courses with vivid videos and electronic systems etc., the use of ICT in medical education is still insufficient in developing countries compared to developed countries [15, 16]. Therefore, ICT holds enormous promise for the field of health education and research in developing countries, but it depends on the capacity to use them and access to ICT related resources.

Faculty members generally have positive attitudes towards ICT skills and they are optimistic about students' knowledge and skills in mastering ICT skills [17]. Surprisingly, they tend to have a negative attitude towards its widespread use in the classroom and doubt its role in promoting teaching effectiveness[15, 18], because they consider that the use of new technology would require more time to learn before its application [19]. Furthermore, the use of ICT skills among faculty members is limited and often focuses on a narrow applications, mainly for such private purposes as data analysis software, using social media or word processing, etc [7, 20, 21]. However, all these studies were conducted in developed countries, and limited studies on the use of ICT skills in developing countries were performed. Taken together, to help design a future training curriculum, we conducted this study to investigate the use of ICT in Chinese medical schools, and also to explore the attitudes and needs of the medical school faculty members' skills on ICT use.

Methods

Subjects

All subjects were faculty members involved in undergraduate and graduate level medical education from the selected medical universities in southern China, including Guangxi Medical University (GXMU), Guangxi University of Chinese Medicine (GXUCM), Guilin Medical University (GLMU), Guangzhou Medical University(GZHMU), Kunming Medical University KMMU), and Fudan University (FDU). All participants

were required to meet the following inclusion criteria: 1) engaged in health sciences research at the selected universities and 2) were willing to give consent to participate in this study.

Data collection and Measures

A self-completed online questionnaire was used for data collection. The online data was collected during December 2016 to March 2017. The questionnaire was developed based on our earlier qualitative study among the health sciences faculty members [22] and was pilot tested with ten faculty members. The questionnaire gathered data on: demographic characteristics (age, gender, professional level, working university, number of years working in the field, focused research field and highest educational attainment), questions on ICT use, use of ICT tools, suggested content for an ICT curriculum and form of marketing approaches and attitudes towards ICT use. This study was approved by the Ethics Committee of the Guangxi Medical University (No. IRB-SPH-2015: 009).

Statistical analysis

Numerical data was described as mean ± standard deviation, and categorical data was presented as frequency and percentages. We categorized subjects into two groups: ICT using group (i.e. those used ICT tools) and ICT free group (i.e. those who did not use ICT tools). ICT use was defined as using any ICT and/or biomedical informatics tools in their current research activities. Comparisons of numerical and categorical data were performed using Student's independent t-test and Chi-square test, respectively. All analyses were processed using the SPSS software, version 22.0. A P value of <0.05 was considered as statistically significant.

Results

Description of the participants

A total of 270 faculty members were enrolled in this study during the online data collection period. As shown in Table 1, of the 270 faculty members, 54% were female, the mean age was 33.23 years (standard deviation ±7.20). Most of the participants were from GXMU (67%), and involved in the field of Clinical Medicine (55%) and Public Health (20%). Tutors and lecturers accounted for 34% and 41% of all subjects respectively, and faculties with undergraduate and master's degrees represented 27% and 53% of the total respectively. Only 8% of the participants received ICT related training and most faculties did not take an online course prior to this study (68%). Of the participants, 76% were using ICT in their research and other professional work (i.e. ICT using group). The ICT- using group had longer work experience than

the ICT-free group (7.12 years vs. 5.37 years, P= 0.047), and a higher percentage of the ICT users received training (10%) than the ICT-free group (2%) (P=0.035).

Use of ICT tools among faculty members

As shown in Table 2, most frequently used tools were mobile phone (83%), the Internet (70%), non-mobile computer system (58%), WeChat (58%) and QQ (42%). Other tools including radio, cable TV, skype and CD-ROM were less used. The use of non-mobile computer system, WeChat and QQ was more frequent in ICT-using group than in ICT-free group (P= 0.023, 0.002 and 0.002, respectively).

Faculty members views on the use of ICT in professional work

As shown in Table 3, most faculty members held the idea that ICT could be used to support for information seeking or decision-support by medical/healthcare providers (67%), support for health information or healthcare advice by patients/laymen (56%) and help in identifying and/or implementing ICT and/or biomedical informatics method(s) to deliver a healthcare intervention (58%), while other uses of ICT were less realized. There were significant differences, between the ICT using and ICT free groups, in terms of the following use: the use of ICT to help in identifying &/or implementing ICT &/or biomedical informatics method(s) to deliver a healthcare intervention (P = 0.033) help in using ICT &/or biomedical informatics to deliver healthcare in urban/suburban settings (P = 0.008), and support on using ICT &/or biomedical informatics methods in their own research (P = 0.011).

Attitudes towards the importance of teaching content in an ICT training course

As shown in Table 4, the most valuable items in an ICT training course were “b. Learning what researchers need to know about ICT to be efficient & effective researchers”(74%), “t. Choosing the best ways to analyze specific data & address specific research questions”(72%), “d. Most useful ICT research methods/resources across the research process & where/how to access them”(71%), “o. Assuring data quality & fidelity when using electronic methods to acquire/ capture data”(71%) and “r. Best practices for managing data, including storage, security & retrieval”(71%). There were significant differences, between the ICT using and ICT free groups, towards the following statements: “a. An overview of ways that ICT can support/enhance the entire research process” (P = 0.013), “ d. Most useful ICT research methods/resources across the research process & where/how to access them” (P = 0.026), and “j. What kinds of databases exist, how to access them & possible new uses of these data in research” (P = 0.041).

The faculty members’ perspectives on the marketing means of ICT based education and training

As shown in Table 5, the most preferred marketing means was “academic health faculty researchers, educational program directors/education faculty & directors of healthcare service programs who have successfully used ICT in their work”, with a response rate of 32%. The attitudes towards the importance of different categories of marketing means were not significantly different between the ICT using and ICT free groups (P> 0.05).

The possible means of ICT marketing or promotional messages

Table 6 describes the best ways and contents to reach academic healthcare faculties with marketing or promotional messages of ICT related training. The preferred content was “Give presentations at GXMU & other target universities on key ICT-related topics and the use of ICT by faculty researchers, educators and clinical service directors at their institutions and at other institutions in China and elsewhere”, with an agreement rate of 35%. The importance of different categories of marketing contents were not significantly different between the ICT using and ICT free groups (P> 0.05).

Discussion

This study investigated the use of ICT among health science faculty members from six universities in southern China, as well as faculty members’ perceptions and needs for ICT skills. We observed that most participants used ICT skills in their professional work (76%), but the percentages of teachers who were ever trained on ICT use and those who took an online course before were really insufficient (8% and 32%, respectively), and teachers with longer work experience tended to use ICT in their work (P = 0.047). In addition, the faculty members’ views on the use and importance of ICT in professional work were different between ICT-using group and ICT-free group. A majority of (76%) faculty members used ICT skills in their professional work, but only limited number of faculty members were trained or have taken an online course. This indicates the fact that despite the wide use of ICT skills in faculty members, formal ICT training courses were lacking, underscoring the need for organized training program to ensure accurate and standardized knowledge among the faculty members. Based on this situation, a ICT training course in these universities would contribute to great benefits [22]. In this study, faculty members with longer working seniority tended to use ICT in their work. Previous studies suggest that ICT skills learning would increase the workload of faculty members, because it takes a significant amount of time and cost [23, 24]. At the same time, most faculty members believe that using ICT in their teaching process increase their responsibility [23, 24]. Other studies also report that as working seniority increases, the work outputs of faculty members increase, and this would promote their research funding, and in turn increase their research output by using different ICT tools [25, 26]. Though it was not statistically significant, ICT-using group was older than ICT-free group (33.22 *vs* 31.92). Faculty members with an age of 31-35 years had a better working output[27], and most of our participants belong to this age group, so a small age gap may lead to a large output gap. Taken together, faculty members with longer seniority have more

time, experience, energy and funds, so they could possess the capacity to use ICT tools and access to ICT resources.

ICT is a set of information technologies, including mobile phone, Skype and all the different computing and mobile-type devices [28]. In this study, the most frequently used tools were mobile phone (83%), the Internet (70%), non-mobile computer system (58%), WeChat (58%) and QQ (42%), and the use of non-mobile computer system, WeChat and QQ was more frequent in ICT-using group. Application of ICT have grown tremendously in universities and would continue to promote social work education [29]. Usually, the use of ICT has improved both administrative and academic processes in colleges and universities. Faculty members can utilize course management systems to manage a course conveniently, deliver teaching materials and students can harness it to assist each other. Furthermore, ICT can be used as a crucial methodology to advance research missions for universities, such as network modeling and computer simulations [30]. All these indicates that ICT has the potential for both faculty members and students to form a more effective and efficient learning and information sharing environment, as well as an innovative tool for global health research. However, the views on the use of ICT in professional work varied between the two groups, mainly in whether ICT can be used to help in identifying &/or implementing ICT &/or biomedical informatics method(s) to deliver a healthcare intervention, help in using ICT &/or biomedical informatics method(s) to deliver healthcare in urban/suburban settings and support on using ICT &/or biomedical informatics methods in research ($P < 0.05$ for all). This phenomenon indicates that the understandings of ICT use between two groups are different, and faculty members using ICT are better aware of the advantages of ICT and can make full use of them in work compared to those who do not use ICT. Therefore, a specialized curriculum is required to enable faculty members to gain an in-depth understanding and application of ICT in order to improve the teaching and research qualities [31].

Learning what researchers need to know about ICT to be efficient and effective researchers (74%) was the most valuable content in an ICT training course, and followed by choosing the best ways to analyze specific data & address specific research questions (72%). The most acceptable marketing means and best ways were all involved in the successful application of ICT, suggesting the importance of ICT practice at work. Previous studies have revealed the importance of practicality of an ICT training course [32, 33]. In consistent with these studies, our study also suggest that the course designed should be practical, and should focus on promoting regular work. Most faculty members want to know how ICT can be used at their institutions, and given the differences in research fields among faculty members, the teaching content should be specialized according to research fields to satisfy faculty members' needs. For instance, faculty members from fields of public health, clinical medicine and pharmacy are engaged in different types of research focus (i.e. biomedical or/and population based), thus the needs for ICT skills are also varied among faculty members. Therefore, an ICT training course in universities should be

based on the actual requirements of faculty members and could be customized according to the specific academic discipline.

The major strength of our study is the diverse range of participants in terms of research field, gender, professional level, work experience and location (6 cities in southern China). This should be noted that the universities involved in our study are from developed area as well as less developed area, which well represents the university settings in southern China. However, this study also presents several limitations. First, all participants engaged in medical education were enrolled from southern China, thus cautions should be taken when the findings are applied to other research fields and in other parts of China. Second, faculty members who do not use ICT may be did not participate in the study and caused sampling bias. Nevertheless, this study focuses on the perception, attitude and situation of ICT use and training content among faculty members in several southern Chinese universities, and would encourage more studies on promoting the development and use of ICT tools for biomedical and population health research in universities in China, and in other developing countries.

Conclusions

This study suggests that faculty members from medical universities in southern China use ICT commonly, but they lack in-depth understanding of ICT use. The findings also demonstrate the shallow perception and positive attitude of ICT use among faculty members and highlight an urgent need for an ICT training course to promote the learning and teaching environment in most medical universities in China.

Abbreviations

ICT: Information and communication technology; GXMU: Guangxi Medical University; GXUCM: Guangxi University of Chinese Medicine; GLMU: Guilin Medical University; GZHMU: Guangzhou Medical University; KMMU: Kunming Medical University; FDU: Fudan University.

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committee of the Guangxi Medical University (No. IRB-SPH-2015: 009).

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on request.

Competing interests

The authors declare that they have no competing interest. The authors alone are responsible for the content and writing of this article.

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Authors' contributions

Not applicable.

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Authors' information

ASA, RF and LQ designed the study and developed the data collection tool. LX, JY and KH lead the data collection and analyses of data. ASA and LY guided the overall implementation of the study in China and supervised the analysis and interpretation of data for this manuscript. JY, LC, DU and HH managed the online data collection tool and ensured the quality control of the data. LX conceptualized the manuscript, lead preparation of the first draft of the manuscript and managed subsequent revisions to incorporate comments from all the co-authors. All co-authors commented on the earlier drafts of the manuscript and approved the final draft for submission. ASA and LY are joint corresponding authors.

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Tables

Table 1 Demographic characteristics of the study population

Variables	Total N=270 n(%)	ICT-using group N1=206 n(%)	ICT-free group N2=63 n(%)	P-value
Gender				0.380
Male	98(46)	98(46)	26(41)	
Female	145(54)	108(54)	37(59)	
Age	33.23±7.20	33.22±7.93	31.92±8.39	0.619
working seniority*	6.77±6.36	7.12±6.80	5.37±4.79	**0.047**
Universities				0.052
Guangxi Medical University	180(67)	140(68)	40(64)	
Guangxi University of Chinese Medicine	15(6)	11(5)	4(6)	
Guilin Medical University	22(8)	11(5)	11(18)	
Guangzhou Medical University	6(2)	5(2)	1(1)	
Fudan University	17(6)	15(7)	2(3)	
Others	29(11)	24(12)	5(8)	
Schools				0.800
Clinical Medicine	149(55)	113(55)	36(57)	
Public Health	54(20)	43(21)	11(18)	
Pharmacy	19(7)	13(6)	6(10)	
Nursing	24(9)	18(9)	6(10)	
Medical Information and Management	11(4)	10(5)	1(2)	
Others	12(5)	9(4)	3(5)	
Current position				0.542
Tutors	91(34)	64(31)	27(43)	
Lecturer or Assistant Professor	110(41)	88(43)	22(35)	
Associate Professor	30(11)	24(12)	6(10)	
Professor	16(6)	13(6)	3(5)	
Others	22(8)	17(8)	5(8)	
Education (completed)				0.651
University graduate	73(27)	55(27)	18(29)	
Master’s degree	143(53)	111(54)	32(51)	
Doctoral degree	43(16)	31(15)	12(19)	
Post-doctoral diploma	10(4)	9(4)	1(2)	
Have any of you had training, either formal or informal, in any aspect of ICT or biomedical informatics?				**0.035**
Yes	21(8)	20(10)	1(2)	
No	248(92)	186(90)	62(98)	
Have you ever taken an online course?				0.725
Yes	86(32)	67(33)	19(30)	
No	183(68)	139(68)	44(70)	

Table 2 Use of biomedical informatics tools among the faculty members

Biomedical informatics tools	Total n=270(%) N(%)	ICT-using group n=206(%) N(%)	ICT-free group n=63(%) N(%)	P-value
Mobile phone	223(83)	171(83)	52(83)	0.931
Non-mobile computer system	157(58)	128(62)	29(46)	**0.023**
Radio	12(5)	10(5)	2(3)	0.829
The Internet	188(70)	149(72)	39(70)	0.114
Cable TV	22(8)	18(9)	4(6)	0.545
CD-ROM	15(6)	14(7)	1(2)	0.207
WeChat	157(58)	131(64)	26(41)	**0.002**
QQ	114(42)	98(48)	16(25)	**0.002**
Skype	10(4)	9(4)	1(2)	0.522

#the total percentages may be more or less than 100% due to the rounding of the figures

Table 3 The views of faculty members on the use of ICT in professional work

Items	Total n=270 N(%)	ICT-using group n=206(%) N(%)	ICT-free group n=63(%) N(%)	P-value
a. Support for information seeking or decision-support by medical/healthcare providers	181(67)	138(67)	43(68)	0.852
b. Support for health information or healthcare advice by patients/laymen	151(56)	118(57)	33(52)	0.493
c. Help in identifying &/or implementing ICT &/or biomedical informatics method(s) to deliver a healthcare intervention	155(58)	126(61)	29(46)	**0.033**
d. Help in using ICT &/or biomedical informatics to deliver healthcare in urban/suburban settings	116(43)	98(48)	18(29)	**0.008**
e. Help in using ICT &/or biomedical informatics to deliver healthcare in remote or rural settings	93(35)	73(35)	20(32)	0.590
f. Help in using ICT &/or biomedical informatics to monitor health & healthcare interventions in urban/suburban settings	80(30)	67(33)	13(21)	0.071
g. Help in using ICT &/or biomedical informatics to monitor health & healthcare in rural or remote settings	82(31)	69(34)	13(21)	0.052
h. Support on using ICT &/or biomedical informatics methods in my research	96(36)	82(40)	14(22)	**0.011**
i. Support for gathering data for research from research subjects	112(42)	89(43)	23(37)	0.345
j. Facilitating collaboration with research/clinical team members & other individuals	91(34)	73(35)	18(29)	0.314

Table 4 Faculty members' attitudes towards the importance of teaching content in ICT training course

Items	Total (n=270) Very important /Essential N(%)	ICT-using group (n=207) Very important /Essential N(%)	ICT-free group (n=63) Very important /Essential N(%)	P-value
a. An overview of ways that ICT can support/enhance the entire research process	180(67)	140(71)	34(54)	**0.013**
b. Learning what researchers need to know about ICT to be efficient & effective researchers	199(74)	156(76)	43(68)	0.237
c. Overview of types of ICT research methods/resources for researchers	171(64)	134(65)	37(59)	0.362
d. Most useful ICT research methods/resources across the research process & where/how to access them	192(71)	154(75)	38(60)	**0.026**
e. What is new/important in ICT research methods/resources that will help researchers make significant advances in their research	188(70)	149(72)	39(62)	0.114
f. Developing an overall plan for learning about & using ICT research methods/resources in your research projects	182(68)	139(68)	34(68)	0.908
g. Best ways to set up an experiment using ICT research methods/resources before generating data	186(69)	144(70)	42(67)	0.626
h. Fundamentals of how databases are structured, attributes of data, ways data can be stored/retrieved & how pieces of data relate to each other	173(64)	133(65)	40(64)	0.877
h. Fundamentals of how databases are structured, attributes of data, ways data can be stored/retrieved & how pieces of data relate to each other	171(64)	136(66)	35(56)	0.131
j. What kinds of databases exist, how to access them & possible new uses of these data in research	186(69)	149(72)	37(59)	**0.041**
k. Creating new databases, determining what data to collect, how to represent the data, how pieces of data need to relate to each other (i.e. data modeling)	175(65)	134(65)	41(65)	0.996
l. Principles & challenges when	155(58)	120(58)	35(56)	0.705

integrating or using multiple datasets				
m. Using data from electronic health records in research	179(67)	140(68)	39(62)	0.373
n. Informatics principles & electronic methods to collect/capture data in clinical settings, including use of specific devices like Smartphones	186(69)	147(71)	39(62)	0.155
o. Assuring data quality & fidelity when using electronic methods to acquire/ capture data	191(71)	147(71)	44(70)	0.816
P. The concept & importance of data standards	176(65)	138(67)	38(60)	0.330
q. Issues of security, ethical, legal, regulatory & confidentiality considerations in accessing/ using data	182(68)	144(70)	38(60)	0.155
r. Best practices for managing data, including storage, security & retrieval	190(71)	149(72)	41(65)	0.269
s. Using informatics methods to manipulate & analyze data, including understanding what you can & cannot do with data	187(70)	146(71)	41(65)	0.382
t. Choosing the best ways to analyze specific data & address specific research questions	193(72)	149(72)	44(70)	0.701
u. Tools & approaches for interpreting results, such as software to help visualize data	177(66)	139(68)	38(60)	0.295
v. Conducting systematic data searches (e.g., literature reviews, vetted sources of information)	177(66)	139(68)	38(60)	0.295
w. Using informatics search methods to help develop research protocols	164(61)	127(62)	37(59)	0.678
x. Using information technology-based methods to recruit human subjects	148(55)	113(55)	35(56)	0.922
y. Using information technology-based methods to develop & implement clinical decision support tools	160(60)	118(57)	42(67)	0.184
z. Seeking help - kinds of informatics help you can get, knowing when to ask for help, kinds of people to approach for	170(63)	127(62)	43(68)	0.342

help with various types of issues/questions				
aa. Using ICT to deliver clinical & population health interventions	175(65)	134(65)	41(65)	0.996
bb. Collaborating effectively with informatics/ IT consultants and experts (i.e. knowing how to ask for what you want)	175(65)	130(63)	45(71)	0.225
cc. Performing personal “computer hygiene” (backing up files, organizing files, archiving email)	181(67)	140(68)	41(65)	0.670

Table 5 The faculty members’ perspectives on the marketing means of ICT training program

Items	Total n=270(%) N(%)	ICT-using group n=206 N(%)	ICT-free group n=63 N(%)	P-value
Examples of academic health faculty researchers, educational program directors/education faculty & directors of healthcare service programs who have successfully used ICT in their work.	87(32)	63(31)	24(38)	0.265
Examples of academic healthcare faculty (see in item (a) above) who learned how to use ICT in their work from a formal ICT education program.	63(23)	50(24)	13(21)	0.551
Examples of time efficient & convenient access to ICT educational programs for busy academic health faculty.	74(28)	57(28)	17(27)	0.915
Examples of programs that teach academic healthcare faculty skills, etc. in which the faculty who attend the program obtain academic credit and/or work performance credit for taking the academic skill-development course and/or of demonstrating that they used the training in their academic work.	45(17)	36(18)	9(14)	0.553

Table 6 The best ways to reach academic healthcare faculty at your university or other universities in China with these ICT training marketing or promotional messages

Items	Total n=270 N(%)	ICT-using group n=206 N(%)	ICT-free group n=63 N(%)	P-value
To persuade the first groups of faculty who take the ICT course and apply it to their academic work to share their personal experiences and achievements with other faculty at their universities.	69(26)	54(26)	15(24)	0.702
Give presentations at GXMU & other target universities on key ICT-related topics and the use of ICT by faculty researchers, educators and clinical service directors at their institutions and at other institutions in China and elsewhere.	93(35)	67(33)	26(41)	0.202
Publicize the course(s) and their “results” through electronic based academic communications and other means to faculty, students, and staff of the University and its affiliated hospital(s) & other healthcare delivery entities.	42(16)	31(15)	11(18)	0.644
Promote the value of ICT education of students, faculty and other staff at the university as an important component of research capacity-building.	64(24)	54(26)	10(16)	0.092