Availability and Accessibility of ICT- based Instructional Tools in Medical Colleges in Ogun State, Nigeria

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Abstract

This study assessed the availability and use of ICT-based Instructional tools in selected colleges in Ogun State, Nigeria. This study adopted a descriptive survey research design. Simple random sampling technique was used to select 248 respondents for the study. Data was collected with the use of questionnaires titled (ICT-bIPIMC) and a checklist during their faculty meetings/seminars, and the data collected were analysed uisng simple frequency and percentage techniques.It was revealed that Computer Aided Instruction (CAI), Social Media, Human Patient Simulation (HPS), PowerPoint Slides (Microsoft): PP slides, and Medical videos (MV), Multimedia Classrooms (Audio Visual Centre), Projectors, E-Medical journals and animation clips were the only available ICT-based tools for Instructional tools in Ogun State medical colleges. Based on the findings, Internet connected laptops (34%), E-medical journals (40%), Computer-aided instructions (39%), social media (45%) and online educational forum (37%) were the major ICT-based tools used at least twice daily. The study recommended that ICT-based instructional tools should be compulsory for Instructional practices among lecturers, laboratory technologists and clinical instructors, medical colleges and should be motivated to use ICT-based tools for Instructional tools through training and workshop on how to effectively use the available tools.

Keywords: ICT-based Instructional tools, Medical Colleges, Availability, and Usage.

Introduction

Technological advancements of this era have revolutionized every field of life, teaching is no exception. The basis of the medical curriculum consists of the fundamental theory and practice of medicine, specifically basic bio-medical, behaviour and social sciences, clinical sciences and general clinical skills, including clinical decision skills, communication abilities, and inter-professional collaboration.

Information and Communication Technology (ICT) tools are important in training, educating and for capacity building programs, which play key roles in instructional practices. ICT's impact on medical education has evolved a great deal as both medical science and computer technology have undergone profound enhancement. While developed countries could harvest their investments in ICT, medical schools in developing countries are still struggling with designing, implementing, and instructional delivering through ICT in medical education (Stefam, Alexandra, & Nikolay, 2016).World Federation for Medical Education (2016) refers to medical school as an educational institution providing a basic Undergraduate and Post graduate programmes in medicine and other health related programmes with medical faculty, medical college, medical academy or medical university. The medical school can be part of or affiliated to a university or can be an independent institution at equal level.

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One of the key indicators of best global practices in medical colleges in the world is ICT-based Instructional tools which may include software and hardware utilization during teaching and learning process in a medical college, it is a fundamental redesign of the instructional model, shifting from lecture to student-centered instruction, increasing all forms of interaction and incorporating formative and summative assessment (Stefam, Alexandra, & Nikolay, 2016). The Association of American Medical Colleges (2007) clearly indicates the following ICT-based instructional technologies that can be used for medical education, which is as follows; Computer Aided Instruction (CAI), Virtual Patients (VP), Social Media, Human Patient Simulation (HPS), Screen-based Virtual Reality, PowerPoint Slides Microsoft: (PP slides), and Medical videos (MV) and animation clips.

Also, modern course delivery systems have been emphasized among core teaching facilities and modes of learning recommended by Nigerian University Commission (2016) which are: Clinical Skills Laboratory, Classroom Equipment, E-learning materials and Research Information Platforms, the availability of Nigerian Research and Education Network (NgREN) has made access to teaching such as Telemedicine and research information readily accessible, and all Nigerian universities are expected to key into it.

One issue regarding ICT in medical education is availability and usage. While industrialized countries benefit from investing in ICT, developing countries could particularly benefit from ICT mediated education because of the lack of human and non-human resources, poor distribution of facilities, and poor access to the latest educational infrastructure. However, access to technology is often an issue in developing countries and could be a useful tool to address many of the challenges in medical education, but the lack of technology and resources could pose a serious limitation (Maharana, Biswal & Sahu, 2009).

However, researchers have paid more attention to the effect of ICT-based instruction on academic performance in medical colleges with less attention on the extent of availability and accessibility of ICT-based tools in Medical colleges.

Several studies have been done by Albarrak & Al-Ghammas; 2009; Baxi, Shah,Parmar, Parmar, Tripathi; 2011;Potomkova, Vladimir & Schwarz; 2012 in the use of ICT for medical education in relation to academic performance of medical students, but less study has been done to determine the extent to which ICT-based Instructional tools are available and accessed in medical colleges in Nigeria. This study therefore seeks to investigate the availability and accessibility of ICT-based Instructional tools in medical colleges.

Statement of the Problem

Medicine as a discipline is a sophisticated mix of knowledge, skills, behaviour and attitudes; which requires hands-on and holistic teaching and learning approaches. However, best global practices have emphasized ICT-based Instructional practices which rely extensively on utilization of ICT-based Instructional tools in medical colleges. The best global practices in medical colleges cannot be achieved without the knowledge of whether the ICT-based tools are available and accessible or not hence, the need for this study. However, past studies have focused on effects of ICT on student's academic performance in medical colleges while there are few studies that asses the availability and accessibility of ICT-toolsin medical colleges in Nigeria. Therefore, this study assessed the availability and accessibility of ICT-based Instructional tools in selected medical colleges in Ogun State, Nigeria.

Purpose of the Study

The main purpose of this study is to assess the ICT-based Instructional tools in line with the best practices globally being used in medical colleges. The specific objectives of the study are to;

1. Assess the availability of relevant ICT-instructional tools used for teaching and learning in medical colleges in Ogun State;
2. Assess the accessibility of the available ICT-based instructional tools in the medical colleges in the study area.

Research Questions

The following research questions will be answered in this study;
1. What are the availability of relevant ICT-instructional tools used for teaching and learning in medical colleges in Ogun State?
2 Are the ICT-based instructional tools accessible in the medical colleges in the study area?

Conceptual Framework
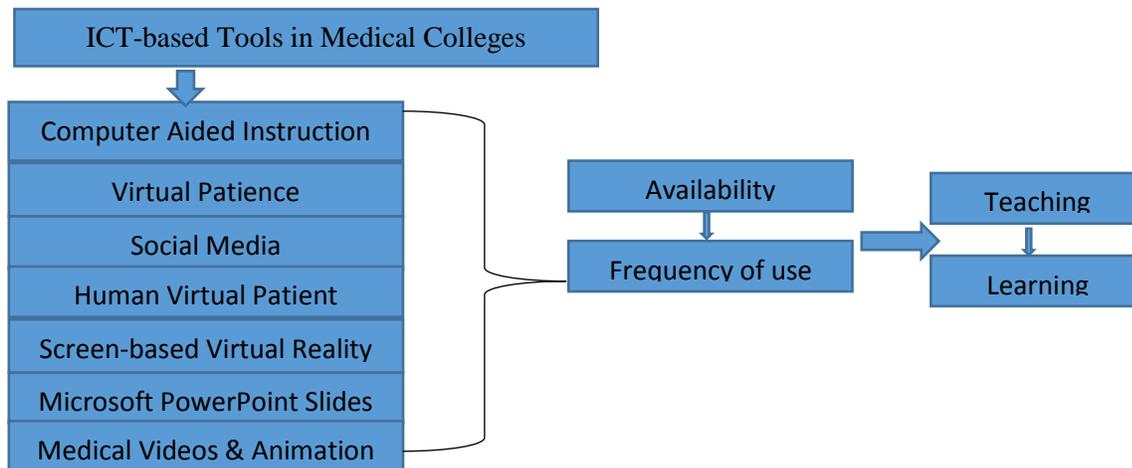
Figure 1. Relationship between the reviewed variables and concept of the study.

Conceptual Model

The above conceptual model shows the interface between Computer Aided Instruction (CAI), Virtual Patients (VP), Social Media, Human Patient Simulation (HPS), Screen-based Virtual Reality, PowerPoint Slides Microsoft: (PP slides), Medical videos (MV), Animation clips and medical sciences as an integral symbiotic. Innovations in the adoption of ICT-based instructional in medical sciences toward a revolution in education, allowing adaptive and collaborative learning by the learners and transforming the role of the teacher. Traditionally, education has been based on attending classes day after day, listening to a lecturer providing the necessary course work information, and going through exams to assess knowledge. The evolution of ICT-based instructional practices and systems has changed the way medicine is taught. Medicine, as a complex multidisciplinary field, has been implementing computerized technologies, with ICT-based tools being a central point of the process in many cases. ICT's impact on medical education has evolved a great deal as both medical science and computer technology have gone under profound enhancement.

Methodology

The descriptive survey research design of the expo-facto type was adopted for the study. The descriptive survey approach was chosen for the present study because it seeks to gain insight into a phenomenon as a means of providing basic information in an area of study. The population for study comprised medical lecturers, clinical instructors and laboratory technologist from Ben Carson Snr. Medical School, Babcock University and Obafemi Awolowo College of Health Sciences, Olabisi Onabanjo University (OOU).These represented the population sampled in the study. Probability sampling was used in this study to give equal opportunity to every unit in the population to be selected in this study. A simple random sampling technique was used to select medical lecturers (236), clinical instructors (65), and laboratory technologist (43). Which will be a total number of 344 respondents used in this study. The researcher used a self-structured questionnaire and a check list designed for data collection in line with the research questions. The instrument on the ICT-based Instructional tools (ICT-bIPIMC) in Ogun State Medical Colleges consisted of 49 set of items.

The data collected from pilot study was used to calculate the reliability coefficient using split-half method. Also, Pearson Product Moment Correlation Coefficient was used to determine the reliability coefficient of the instrument. This indicates that the items were reliable within the acceptable limits. The requirements for internal consistency were an average value of the correlation coefficient which is 0.80. Data generated from the questionnaire

are presented and the data were analysed using SPSS version 21.0, and the results were presented uisng simple frequency counts and percentages.

Results

Analysis of Data

A total of three hundred and forty-four 344copies of questionnaires were distributed, out of which, two hundred and forty-eight248were fully completed and returned.

Presentation of Data

The data were presented in tables using simple frequency and percentage techniques.

Demographic Features of the Respondents

Table 1: Distribution of Respondents by Faculty

Variables	Frequency	Percent
Clinical Sciences	105	42.3%
Pharmacy	18	7.3%
Basic Medical Sciences	87	35.1%
Ben Carson School of Medicine	38	15.3%
Total	**248**	**100.0**

Source: Field survey

Table 1also revealed that faculty of clinical sciences, which houses the department of Medicine, Surgery and obstetrics etc. have the highest respondents, while Basic Medical Science has 35%. Ben Carson School of Medicine 15% and the faculty of Pharmacy 7.3% has the lower respondents due to the staff strength available as at the period the research was conducted.

Table 2 Distribution of Respondents by Qualifications

Variables	Frequency	Percent
PhD.	30	12.0%
M.Phil.	Nil	Nil
M.Ed.	Nil	Nil
B.Sc.	16	7.0%
M.Sc.	38	15.0%
MBBS	100	40.0%
MBChB.	6	2.4%
BMBS	54	22.0%
HND	4	1.6%
Total	248	100%

Source: Field survey

Table 2 revealed that Majority of the respondents from the two medical schools possesses MBBS 40%, BMBS 22% which is the main Medical degree requirements for teaching g and practice of the field of medicine. It was also revealed that M.Ed. and M.Phil. Degrees were not indicated as part of their educational degrees. The respondents also indicated that they have gotten their PhD 12% in the field of their profession. HND 1.6% and MBChB. 2.4% were not indicated as part of the Degree they possess in their field. Some of the respondents have indicated that they have B.Sc. 15% and M.Sc., 7% in the field of practice, which were basically the Laboratory technicians and clinicians from the two universities.

Table 3 Distribution of Respondents by Job Designation

Variables	Frequency	Percent
Lecturer	126	51.0
Laboratory Technologist	68	27.0
Clinical Instructor	54	22.0
Total	**248**	**100**

Source: Field survey

Table 3 shows that majority of the respondents were Lecturers 51% and the Laboratory technologist were 27%, while the clinical instructors where 22%. The result was in concomitant with the staff strength of the two universities based on the percentage indicated in this study

Research Question One: What are the available ICT-based instructional tools used for teaching and learning in medical colleges?

Table 4 showing available of ICT-based instructional tools used for teaching and learning in the medical colleges

Variables	Available		Not available	
Lecturers	**Frequency**	**%**	**Frequency**	**%**
Internet-Connected Desktop Computers	248	100%	Nil	Nil
E-learning	19	7.7%	229	92.3%
Mp3 lectures recorded playback	Nil	Nil	248	100%
Medical videos MV and animation clips	158	63.7%	90	36.3%
Microsoft PowerPoint Slides	128	51.6%	120	48.4%
Projectors	248	100%	Nil	Nil
Social Media	192	77.4%	56	22.6%
E-Medical journals	248	100%	Nil	Nil
Faculty Cybercafé	216	87.1%	32	12.9%
Institutional Virtual Library Digital Library	90	36.3%	158	63.7%
Computer-aided Instruction CAI	128	51.6%	120	48.4%
Online Educational forums	144	58.1%	104	41.9%

Source: Field survey

Table 4 revealed that Internet-based desktop computers were 100%, E-learning was 7.7% was available while 92.3% were not available. Mp3 lectures recorded playback where not available for lecturers. Projectors were 100% available for use. The use of medical videos, 63.7% were available, PowerPoint 51.6% were also available for use. The above table also revealed that Social media platform was 77.4% available for the lecturers and 22.6% indicated that it was not available. Also it was revealed that E-medical journal was 100% available for lecturers use. The study also revealed that the medical colleges have faculty cybercafé in their faculty 87.1%while 12.9% indicated that it was not available for use. Also it was revealed that 36.3% indicated that they have an institutional virtual library (digital library), while 63.7% indicated that it is not available for lecturers use. The table revealed that 51.6% indicated that Computer-aided instruction (CAI) was available for lecturer's use, while 48.4% indicated that it was not available for lecturers use. And finally, it was revealed that online educational forums were available 58.1%while 41.9% indicated that the forum is not available for lecturers use.

Table 5showing available of ICT-based instructional tools used for teaching and learning in the medical colleges

Variables	Available		Not available	
Laboratory Technologists	**Frequency**	**%**	**Frequency**	**%**
Electronics Class Roll ECR	248	Nil	248	100%
Multimedia Classrooms Audio Visual Centre	105	42.3%	143	57.7%
Gaming Application	248	Nil	248	100%
Institutionally-produced Educational Software	22	8.9%	226	91.1%

Source: Field survey

Table5depicts that electronics class roll (ECR) were not available for use. Also it was revealed that multimedia classrooms (Audio Visual Centers) were 42.3% available, while 57.7% indicated that it was not adequately available for the laboratory technologist's use. The above table indicates that Gaming application was not available for use. And finally, it was revealed that institutionally-produced educational software is 8.9% available, while 91.1% indicated that the software is not available for use.

Table 6 showing available of ICT-based instructional tools used for teaching and learning in the medical colleges

Variables	Available		Not available	
Clinical Instructors	Frequency	%	Frequency	%
Virtual Patient VP	80	32.3%	168	67.7%
Human Patient Stimulation HPS	248	100%	248	Nil
Screen-based Virtual Reality	99	39.9%	149	60.1%

Source: Field survey

Table 6 revealed that 32.3% indicated that virtual patients (VP) were not available for teaching and learning, while 67.7% were not available. Also the table depicts that human patients were 100% available for teaching and learning. And finally, the clinical instructors indicated that screen-based virtual reality is available for use 39.9%, while 60.1% indicated that screen-based virtual reality is not adequately available for teaching and learning.

Research Question Two: Are the ICT-based instructional tools accessible inthe medical colleges?

Table 7showing if the ICT-based instructional tools are accessible in the medical colleges.

ICT-based Instructional Tools	Once weekly		Twice weekly		Thrice weekly		Daily		Not at all	
	F	%	F	%	F	%	F	%	F	%
Internet-Connected Desktop Computers	86	34.7%	98	39.5%	30	12.1%	15	6.0%	19	7.7%
Virtual Patient VP	28	11.3%	18	7.3%	10	4.0%	97	39.1%	95	38.3
E-Medical journals	100	40.3%	12	4.8%	24	9.7%	48	19.4%	24	9.7%
Faculty Cybercafé	42	16.9%	30	12.1%	19	7.7%	106	42.7%	51	20.6%
Institutional V-Library Digital Library	22	8.9%	52	20.9%	32	12.9%	52	20.9%	90	36.3%
Human Patient Stimulation HPS	62	25%	48	19.4%	44	17.7%	34	13.7%	60	24.2%
Social Media	112	45.2%	14	5.6%	64	25.8%	32	12.9%	26	10.5%
Projectors	194	78.2	6	2.4%	16	6.5%	20	8.1%	12	4.8%
Screen-based Virtual Reality	32	12.9%	Nil	Nil	52	20.9%	64	25.8%	100	40.3%
Computer-aided Instruction CAI	99	39.9%	63	25.4%	24	9.7%	48	19.4%	14	5.6%
Electronics Class Roll ECR	4	1.6%	44	17.7%	22	8.9%	18	7.3%	160	64.6%
Multimedia Classrooms A/V Centre	30	12.1%	49	19.8%	7	2.8%	30	12.1%	132	53.2%
Gaming Application	2	0.8%	52	20.9%	2	0.8%	42	16.9%	150	60.5%
Institutionally made Educational Software	16	6.5%	38	15.3%	20	8.1%	54	21.8%	110	44.4%
Online Educational forums	94	37.9%	15	6.0%	20	8.1%	15	6.0%	104	41.9%
Mp3 lectures recorded playback	8	3.2%	8	3.2%	2	0.8%	38	15.3%	192	77.4%
e-learning	10	4.0%	10	4.0%	74	29.8%	26	10.5%	128	51.6%

Source: Field survey

Table 7 depicts that the respondents use Internet-Connected Desktop Computers once weekly 34% twice weekly 39% thrice weekly 12% daily 6% and 7% does not use it at all for instructional purposes. Also, the respondents use Virtual Patient VP once weekly 11% twice weekly 7% thrice weekly 4% daily 39% and 38% does not use it at all for instructional purposes

Next to the table indicates that the respondents use E-Medical journals once a weekly 40% twice weekly 4% thrice weekly 9%, daily 19%, while 9% does not use it at all for instructional purposes. The table indicated that the respondents use Faculty Cybercafé once weekly 16%, twice weekly 12%, thrice weekly 7%, daily 42%, while 20% does not use it at all for instructional purposes.

Also, the table indicated that the respondents use Institutional V-Library Digital Library once weekly 8%, twice weekly 20%, thrice weekly 12%, daily 20%, while 36% does not use it at all for instructional purposes. The table above depicts that the respondents use Human Patient Stimulation HPS at least once weekly 25%, twice weekly 19%, thrice weekly 17%, daily 13%, while 24% does not use it at all for instructional purposes.

Also, the above table revealed that the respondents at least use social media once weekly 45%, twice weekly 5%, thrice weekly 25%, daily 12%, while 10% does not use it at all for instructional purposes. The above table revealed that the respondents use projectors at least once weekly 78%, twice weekly 2%, thrice weekly 6%, and daily 8%, while 4% does not use it at all for instructional purposes.

The table also revealed that the respondents use screen-based virtual reality at least once weekly 12%, thrice weekly 20%, and daily 25%, while 40% does not use it at all for instructional purposes. The table depicts that the respondents use computer-aided instructions (CAI) at least once weekly 39%, twice weekly 25%, and daily 9%, while 5% does not use it at all for instructional purposes.

Also the above table indicates that the respondents use electronic class roll at least once weekly 1%, twice weekly 17%, thrice weekly 8%, and daily 7%, while 64% does not use it at all for instructional purposes. The table also revealed that the respondents use multimedia classroom A/V at least once weekly 12%, twice weekly 19%, thrice daily 2% and daily 12%, while 53% does not use it at all for instructional purposes.The table depicts that the respondents use gaming applications at least once weekly 0.8%, twice weekly 20%, thrice weekly 0.8% and daily 16%, while 60% does not use it at all for instructional purposes. Also the table revealed that the respondents use institutionally made educational software at least once weekly 6%, twice weekly 15%, thrice weekly 8% and daily 21% while 44% does not use it at all for instructional purpose.It also revealed that the respondents use online educational forums at least once weekly 37%, twice weekly 6%, thrice weekly 8% and daily 6% while 41% does not use it at all for instructional purpose. The table also revealed that the respondents use Mp3 lecture recorded playback at least once weekly 3%, twice weekly 3%, thrice weekly 0.8 and daily 15% while 77% does not use it at all for instructional purpose.Finally, the above table depicts that respondents use e-learning at least once weekly 4%, twice weekly 4%, thrice weekly 29% and 10% daily, while 51% does not use it at all for instructional purpose.

Discussion of Findings

This study revealed that Internet-based desktop computers, E-Medical journals, faculty cybercafé, social media, projectors, CAI, PowerPoint Slides, online educational forums, and Medical videos/animation clipsare adequately available teaching and learning tools for lecturers in the medical colleges. Which is in concomitant with the basic requirements by the Association of American Medical Colleges, (2007) and Nigeria Undergraduate Medical and Dental Curriculum Template,2012 which clearly states that Computer Aided Instruction (CAI), Social Media, PowerPoint Slides Microsoft: PP slides, and Medical videos MV and animation clips should be the best global tools for Instructional tools in medical education. These ICT- based instructional tools are very crucial for teaching and learning in the medical colleges. Asefeh, Badiey and Houshyari, (2012) affirmed that ICT-based tools will help medical lecturers spend less time delivering information and will allow students to take a more active role in their learning and alter the pace of their own learning using the tools.

The study revealed that E-learning, Mp3 lectures recorded playback and institutional virtual library digital library are not readily available for lecturers use. These findings are in agreement with the findings of Jham(2008) and Everhard (2009) that Mp3 lectures recorded playback is an important mobile educational tool for the target audience to access the information "where – when – how" they want, but it is yet to be fully used in medical colleges. Albarrak AI and Al-Ghammas (2009) also affirmed with the findings that e-learning can be effective in addressing most health and medical education through the delivery of learning material without boundaries.

Finally, the findings of this study revealed that Internet-Connected Desktop Computers, Medical videos MV and animation clips, Microsoft PowerPoint Slides, Projectors, Social Media, E-Medical journals, Faculty Cybercafé, Institutional Virtual Library Digital Library, Computer-aided Instruction (CAI), Online Educational forums, Multimedia Classrooms Audio Visual Centre, Virtual PatientVP, Human Patient Stimulation HPS, Screen-based Virtual Realitywere the ICT-based tools used, at least once dailyby the lecturers, laboratory technologist and clinical instructors in the medical colleges. Albarrak and Al-Ghammas (2009); Baxi, Shah, Parmar, Parmar, and Tripathi (2011); Potomkova, Vladimir and Schwarz (2012);Amruta, Kulkarni, Chari andTanuja (2012) supports this finding through there reports the need for availability and accessibility of ICT-based tools for instructional purposes in medical colleges. Yusufu, Kajuru and Musa (2014) support the fact that ICT-based instructional tools usage in the teaching/learning process can enhance instructional methods with emphasis on learner's active participation. The findings of the study also revealed that electronic class records, multimedia AV Centers, MP3 playback recording and e-learning are not being used by the lecturers, laboratory technologist and clinical instructors in the medical colleges.

The plausible reasons for this might traced to the fact that these ICT-based tools are part of the ICT-based instructional tools recently recommended for use in medical colleges and might still be in the process of acquisition.

Conclusion

The study revealed that ICT-based instructional tools were not adequately available in the medical colleges, and accessibility of the tools are moderate and still needs be improved. Hence, availability and access to ICT-based instructional tools such as Computer Aided Instruction (CAI),Social Media, and Human Patient Simulation HPS, PowerPoint Slides Microsoft: PP slides, and Medical Videos MV, Multimedia Classrooms Audio Visual Centre, Projectors, and E-Medical journals, and Animation Clips in medicine education will bring about quality and appropriate improvement in training medical students in the medical colleges.

Recommendations

1. Based on the findings of this study, there is a great need for medical colleges to provide MP3 lecturers recorded playback devices, E-learning platforms, and digital libraries for lecturers, so as to enhance the Instructional tools in the medical colleges.
2. Medical colleges should provide institutionally-produced educational software applications that will be installed on student's smartphones and tablets through the laboratory technologist, which in turn create a knowledge sharing hub between teachers and learners in the medical colleges.
3. Medical colleges should provide virtual patients and screen based virtual reality for clinical instructions, which will help students handle situations that involves strong emotions like bad news or dealing with violent, aggressive patients and reduce the dangers of hospital infections.

Suggestions for Further Studies

The scope of the study was limited to medical colleges in Ogun State. Nigeria, which was a result financial incapability. Hence, there is a need to expand the scope to other medical colleges in the southwestern part of Nigeria for adequate generalization of research findings.Finally, further studies need to be done to assess teacher's competence on the use of ICT-based instructional tools in medical colleges.

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