

## Teachers' Use of Information and Communications Technology in Education: Cameroon Secondary Schools Perspectives

**Shaibou Abdoulai Haji**

*Korea University  
haji@korea.ac.kr*

**Gracemary Eloheke Moluayonge**

*Korea University  
graciacallisse@yahoo.com*

**Innwoo Park**

*Korea University  
parki@korea.ac.kr*

### ABSTRACT

Information and Communications Technology (ICT) offers innovative tools for restructuring teaching and learning processes in preparing students for the 21<sup>st</sup> Century skills. However, there is no sufficient and reliable data concerning how the use of ICT fit in different school cultures in Cameroon, and how teachers with varying pedagogical and domain expertise and learning experiences are able to function with various network learning environments. This paper discusses teachers Use of ICT in Education on the basis of intensive case studies conducted in Cameroon secondary schools. A total of 320 teachers from 16 public, denominational and lay private schools from two regions in Cameroon participated in this study. The survey was used for data collection. Descriptive statistics and independent sample t-tests and ANOVA were used to analyse the data. The results of this study indicate teachers' perceived ICT usage, perceived access to ICT, perceived ICT competence and perceived ICT training support were low. Furthermore, the analysis showed that teachers in an urban area perceived the use of ICT and perceived access to ICT was higher than teachers in the rural area. Finally, this study discovered that there was no significant difference in public, private and denominational school teachers' use of ICT, access to ICT, competencies and training support. The results provide insights into factors that teachers perceived as obstacles to the use of ICT in their teaching, particularly in developing nations.

**Keywords:** Information and communications technology (ICT), ICT competence, training support

### INTRODUCTION

Information and communication technology (ICT) plays a crucial role in the knowledge and information society by increasing economic productivity through digital economies, enhancing the delivery of public and private services and achieving broad socio-economic goals in education, health care, employment and social development (UNESCO-UIS, 2015). ICT in education can help individuals to compete and adapt to the knowledge and information society by achieving the 21<sup>st</sup>-century skills which can enhance skilled workforce and social mobility. ICT in education has a multiplier effect throughout the school system, by; enhancing learning and providing students with new sets of skills (Balanksat et al., 2006); reaching students with poor or no access (Young, 2002; UNESCO-UIS, 2015.); facilitating and improving the training of teachers (KERIS, 2011); increasing the possibilities of communication and reinforcement of the development of skills of coordination and collaboration between peers ( Dede, 2009); and minimising costs associated with the delivery of traditional instruction (Gulati, 2008; KERIS, 2012). Research studies have also found that positive perceptions of teachers on ICT integration into schools and ICT usage in their teaching are essential to successful implementation of ICT in education (Almekhlafi and Almeqdadi, 2010; Aydin, 2013; Sipilä, 2014; Choy and Ng, 2015). Teachers' attitudes towards the use of ICT impact on their ICT integration in the classroom, decisions they make and actions they take in classrooms (Shaibou, 2015).

Teachers' use of ICT in Cameroon has been less than optimal, and in spite of its potential educational benefits of ICT in Education, teachers may not have benefits, for various reasons (for example lack of training, resistance to change, among others). Perhaps this is because of the lack of focus on ICT in Cameroon. For example, in 1995, when the National Forum on Education took place in the country's capital, Yaoundé, from the 22<sup>nd</sup> to the 27<sup>th</sup> of May nothing was said about the use of ICT in schools. However, the Law of Orientation of Basic and Secondary

Education (Law No. 98/004 of April 14, 1998) which is mostly based on the recommendations of the National Education acknowledges in general terms the potential contributions of ICT in education. It states in Section 25 (Part III) that “the education provided in schools shall take into account scientific and technological advancement and shall be tailored in terms of content and method, to national and international economic, scientific, technological, social and cultural trends”. ICTs were officially introduced into the Cameroon secondary education system in February 2001 by the president in his message to the youth, in which he called on them to embrace the knowledge economy (Mbangwana, 2008). As a consequence, computers were introduced into many General Secondary schools, and secondary technical/vocational schools and many schools benefitted from presidential grants of multimedia centres connected to the internet.

This initiative has started to address the many problems that plague secondary education in Cameroon, among them acute shortages of basic pedagogic material and human resource inputs, overcrowded classrooms, problems of relevance, and quality, and inadequate access, among others. The use of ICT has the potential to address some of these problems. For example, ICT can improve access to education, equity and the quality of teachers’ professional development (Robinson, 2008; Mervyn, 2002). With all these initiatives in place, there is no clear, recognisable national strategy plan for the integration of modern technology within the school curricula and pedagogical activities. The use of ICT in Cameroon secondary schools mostly depends more on the school leadership and dynamism and enthusiasm of teachers.

Many Secondary Schools have adopted ICT policies and are in the process of implementation. Although significant educational research has been carried out in other countries on the use of ICT in schools, the results were mostly context-specific due to population, sampling, and/or design limitations. In other words, the findings cannot be applied to Cameroon because of contextual differences. Apart from the contextual factors, findings may not apply because of potential differences among participants. That is, Cameroonian teachers have differing experiences with modern technology due to the recent presence of modern technology in their schools and their distinct cultural background (Shaibou, 2015). However, there is no study on ICT integration by teachers in Cameroon secondary schools. Hence, it is important to investigate teachers’ perceptions of ICT access, ICT training, ICT competencies, leadership support, and ICT integration. Research findings from teachers’ perceptions and ICT usage may have important implications for administrators, departments, students, and employers and may enhance educational delivery to students’ learning experience in secondary school, and students’ application of knowledge and skills in the real world of work. Therefore, we reason that it is necessary to investigate teachers’ perceptions and ICT usage in education.

### **Purpose**

The purpose of this paper is to investigate Teachers Use of ICTs in Cameroon Secondary Schools.

### **Research questions**

1. What are teachers’ levels of ICT use in secondary schools?
2. What are teachers’ perceived ICT access, competence, training and ICT support?
3. Are there differences in perceptions of teachers’ ICT use, access, competence, and support with regards to school location (Urban and Rural)?
4. Are there differences in perceptions of teachers’ ICT use, access, competence, and ICT support with regards to school type (Public, Denominational, and Lay Private)?

### **THE STUDY**

ICT is considered as a tool to transform teaching and learning the process, improve students’ learning, to supplement the curriculum and the develop pedagogy (KERIS, 2005, Malaysian Ministry of Education, 2006). The integration of ICT in teaching and learning depend very much on the teachers’ initiatives. The main objective of using ICT in the school is to make the teaching and learning process more effective, efficient and appealing. However, to achieve this, the teachers themselves have to be well prepared and competent in ICT. They have to be ready in terms of ICT competences to face their students who are mostly ‘Digital Natives’ and are generally comfortable using ICT devices.

Nowadays many different types of technology are used to support and enhance the teaching and learning process. This includes everything from surfing the internet to collecting information for lessons preparation and using applications to prepare presentations, creating digital learning materials for students. Also, using ICT to provide feedback, assess students’ learning, communicating online with parents, download and upload material from the school’s portals or learning management system to looking for online professional development opportunities.

In this study, 16 public, private and denominational secondary schools were randomly selected. The schools comprised three public Secondary Schools, three private Secondary schools and two denominational in each region. The categorization of the schools was urban schools and rural schools. The participants were randomly selected. A total of 302 questionnaire were received, representing 94.38 percent return rate from 320 questionnaire distributed to teachers. Of these, 12 questionnaire were deemed unusable, due to data incompleteness, and were subsequently dropped from the data set leaving 290 questionnaire for data screening. Of these, 8 questionnaire were detected as outliers and deleted from the data set leaving 282 cases for the data analysis. The questionnaire consisted of 53 items and was categorised into three sections. Section A consists of seven demographic items, section B consists of ten items of teachers’ ICT usage, and section C contains nine items of perceived access to ICT, twelve items of competency, ten items on training and five items of on types of support training that were related to teachers’ use of ICT. A reliability test was carried out to determine the internal consistency of items in the questionnaire using Cronbach’s  $\alpha$  reliability test. Cronbach’s  $\alpha$  coefficient for the pilot questionnaire was 0.80, and the final questionnaire used for the study was 0.84. According to Kline (2016),  $\alpha$ -value of 0.90 is considered excellent, 0.80 very good and 0.70 acceptable.

**FINDINGS**

Of 282 respondents, 56.6% were males, and 43.4% were females. The age of the teachers ranged from 20 to over 50 years. 29.3% were between 20 and 29 years old; 39.1% were between 30 and 39 years old; 16.0% were between 40 and 49 years old; 15.6% were over 50 years old; 50.4% of the teachers taught in public schools; 25.2% taught in denominational schools, and 24.5% taught inlay private schools. In total 57.4% of the teachers came from urban and 42.6% from rural schools. In terms of academic qualification, 30.1% had DIPES I, 35.5% had bachelor’s degree, 19.5% had DIPES II, and 4.6% had other qualifications. In addition, 35.5% had more than no ICT training experience, 42.6% had had basic ICT training experience, 14.9%t had intermediate level ICT training and 7.1% had other ICT training experience.

**What are teachers’ levels of ICT use in secondary schools?**

In analysing Table, I, the mean values greater than 3.0 is considered high ICT integration in teaching, while mean values less than 3.0 is considered low integration.

Table 1: Percentage, mean and standard deviation of perceived teachers ICT use

Item	Mean	Std. Deviation
Surf the internet to collect information to prepare lessons	2.79	.4434
Browse the internet to collect learning material or resources to be used by students during lessons	2.58	.5084
Use applications to prepare presentations for lessons	2.15	.5236
Create your own digital learning materials for students	1.67	.7371
Prepare exercises and tasks for students	2.26	.4701
Post homework for students on the school website	1.66	.7387
Use ICT to provide feedback and/or assess students’ learning	1.66	.7387
Communicate online with parents	2.15	.4004
Download/upload/browse material from the school’s website or virtual learning environment / learning platform	2.65	.5354
Look for online professional development opportunities	2.80	.4443
Overall ICT Use	2.24	.3298

Note: Cronbach’s  $\alpha=0.78$

The table above shows that teachers’ use of ICT in teaching and learning process is low (m=2.24, SD=.33). Among the 10 items that were designed to measure teachers’ use of ICT, none of the elements has a mean of 3 which is the cutoff mean. This shows that ICT integration in Cameroon secondary schools is low partly due to poor or no proper ICT infrastructure.

**Teachers’ perceived ICT access**

In analysing Table, 2, the mean values greater than 2 is considered good access to ICT in teaching, while mean values less than 2 is considered low Access to ICT.

Table 2: Percentage, mean and standard deviation of perceived Teachers’ perceived ICT access

Item	%			Mean	Std. Deviation
	No Access	Access on demand	Permanent Access		
Desktop computer without internet access	20.9	57.4	21.6	2.01	.6535

Desktop computer with internet access	20.9	56.4	22.7	2.02	.6614
Non-internet-connected laptop, tablet PC, netbook or mini	21.3	60.6	18.1	2.00	.6277
Internet-connected laptop, tablet PC, netbook or mini	42.6	57.4	0	1.58	.4953
Photocopier	57.4	42.6	0	1.58	.4953
Have a Smartphone	0	0	100.0	3.00	.0000
Projector	45.0	55.0	0	1.55	.4984
Digital camera or camcorder	37.9	62.1	0	1.62	.4861
Computer laboratory	21.3	58.2	20.6	2.00	.6480
Overall Access				1.92	.4045
Cronbach's Alpha=	.91				

Table 2 shows that the overall teachers' perceived ICT access is low (M=1.92, SD=.41). However, teachers have good access to; desktop computer without internet access (M=2.01, SD=.65), desktop computer with internet access (M=2.02, SD=.66), Non-internet-connected laptop, tablet PC, netbook or mini (M=2.00, SD=.63), and Computer laboratory (M=2.00, SD=.65). Even though all the teachers have smartphone (M=3, SD=.00) but only very few of them use it in their teaching and learning process as teachers' use of ICT in teaching and learning process is low (m=2.24, SD=.33)

### ICT competency

In analysing Table, 3, the mean values greater than 3.0 is considered high ICT competency, while mean values less than 3.0 is considered low ICT competency.

Table 3: Percentage, mean and standard deviation of perceived ICT Competencies

ICT Competence Item	%				Mean	Std. Deviation
	Very much Competence	Moderate Competence	Little competence	No Competence		
Produce a text using a word processing programme	2.5	70.6	2.5	5.3	2.70	.6054
Use emails to communicate with others	2.1	53.2	37.2	7.4	2.50	.6656
Capture and edit digital photos, movies or other graphics	2.8	40.8	49.3	7.1	2.40	.6624
Edit text online containing internet links and images	0.7	42.2	52.8	5.3	2.37	.5963
Create a database	2.5	45.4	40.8	11.3	2.39	.7186
Organise computer files in folders and subfolders	2.5	62.4	29.8	5.3	2.62	.6268
Use a spread sheet	2.1	62.1	31.6	4.3	2.62	.6037
Create a presentation with simple animation functions	2.5	53.9	37.2	6.4	2.53	.6544
Create a presentation with video or audio clips	2.1	57.8	31.9	8.2	2.54	.6751
Participate in a discussion forum on the internet	0.7	61.0	32.6	5.7	2.57	.6119
Create and maintain blogs or web sites	1.8	28.7	53.2	16.3	2.16	.7054
Participate in social networks	2.5	56.0	34.4	7.1	2.54	.6645
Overall Competence					2.49	.4950
Cronbach's Alpha=	.93					

Table 3 shows that teachers' ICT Competence is low (M=2.49, SD=.50). Among the 12 items that were designed to measure teachers' ICT Competence, none of the elements has a mean of 3 which is the cutoff mean. This shows that teachers need to be trained on the use and integration of ICT in their classrooms. Teachers' ICT Competence is low partly due to little or no support (M=1.95, SD=.53)

### To what extent do you agree with the following professional development opportunities provided by the school in the past one school year?

In analysing Table, 4, the mean values greater than 3.0 is considered high ICT support, while mean values less

than 3.0 is considered low ICT support. 10 items were designed to measure ICT support type provided by the school in the last one year. Table 4 shows that teacher received very low support (M=1.95, SD=.53) in integrating ICT in their teaching and learning process. Only Personal learning about ICT in own time (M= 2.80, SD= .44) and receiving other professional development opportunities related to ICT (M= 2.64SD=1.26) have average means showing that teachers in Cameroon secondary schools try to learn and use ICT on their own.

Table 4: Percentage, mean and standard deviation of perceived ICT training

ICT Training Support item	%				Mean	Std. Deviation
	SA	A	D	SD		
Introductory courses on internet use and general applications (basic Word processing, spread sheets, presentations, databases, etc.)	0	14.2	46.8	39.0	1.75	.6870
Advanced courses on applications (advanced word-processing, complex relational databases, Virtual Learning Environment etc.)	1.4	12.4	39.7	46.5	1.69	.7416
Advanced courses on internet use (creating websites/home page, video conferencing, etc.)	1.4	14.5	41.1	42.9	1.75	.7537
Equipment-specific training (interactive whiteboard, laptop, etc.)	0.7	10.6	47.2	41.5	1.71	.6817
Courses on the pedagogical use of ICT in teaching and learning	1.1	14.5	54.3	30.1	1.87	.6877
Subject-specific training on learning applications (tutorials, simulations, etc.)	0.0	13.8	51.8	34.4	1.79	.6645
Participate in online communities (e.g. mailing lists, twitter, blogs) for professional discussions with other teachers	0.7	12.8	45.0	41.5	1.73	.7058
ICT training provided by school staff	1.1	13.8	42.9	42.2	1.74	.7320
Personal learning about ICT in your own time	1.4	77.3	20.9	0.4	2.80	.4443
Other professional development opportunities related to ICT	0.4	57.4	41.8	0.4	2.64	1.2610
Overall ICT Training					1.95	.5338
Cronbach's Alpha=.89						

### ICT support type

In Table 5, shows the percentage of perceived ICT support types received by the teachers.

Table 5: Percentage, perceived ICT support type received

ICT Support item	%			
	Never Used	Mostly technical Support	Mostly Pedagogical Support	Both technical and pedagogical Support
A more experienced / knowledgeable teacher	34.4	36.2	25.9	3.5
School ICT/technology coordinator	20.9	37.2	24.5	17.4
Other school staff	25.9	35.5	33.3	5.3
Experts from outside the school	35.5	36.9	29.5	8.2
An online helpdesk, community or website	35.8	36.5	29.4	9.2
Cronbach's Alpha=.77				

The table above shows that teachers receive some types of ICT supports. However, the received support level is very low as only 17.4% of the teachers received both technical and pedagogical support from school ICT coordinator, 9.2% received from an online helpdesk, community or website.

### Are there differences in perceptions of teachers' ICT use, access, competence, and training support with regards to school location (Urban and Rural)?

An independent-samples t-test was conducted to compare teachers' ICT use, access, competence, and training support in Urban and Rural schools.



Table 6: t and p values for teachers’ ICT use, access, competence, and training support with regards to school location

Variables	Location	N	Mean	Std. Deviation	t-test	Sig. (2-tailed)
Overall ICT use	Rural	120	2.18	.34259	-2.27	.024
	Urban	162	2.27	.31564		
Overall Access	Rural	120	1.56	.33041	-19.88	.000
	Urban	162	2.19	.19427		
Overall Competence	Rural	120	2.54	.48011	1.33	.185
	Urban	162	2.46	.50448		
Overall Support	Rural	120	1.91	.53837	-1.00	.317
	Urban	162	1.97	.53033		

Note:  $p \leq 0.05$

There was significant difference in ICT use for teachers in Urban area ( $M=2.27$ ,  $SD=0.32$ ) and teachers in Rural area ( $M=2.18$ ,  $SD=0.34$ );  $t(280) = -2.27$ ,  $p=0.024$ . Based on Cohen’s (1988) criteria of effect size, the magnitude of the differences in the means was very low ( $\eta^2=0.018$ ). Also there was significant difference in ICT access scores for teachers in Urban area ( $M=2.19$ ,  $SD=0.19$ ) and teachers in Rural area ( $M=1.56$ ,  $SD=0.33$ );  $t(280) = -19.88$ ,  $p=0.00$ . Based on the effect size, the magnitude of the differences in the means was large ( $\eta^2=0.585$ ).

Furthermore, t-test conducted to compare teachers’ ICT competence and support training scores for Urban and Rural schools. There was no significant difference in teachers’ ICT use, competence, and training support for teachers in Urban and Rural schools as presented in Table 6.

**Are there differences in perceptions of teachers’ ICT use, access, competence, and ICT training support with regards to school type (Public, Denominational, and Lay Private)?**

A one-way between subjects ANOVA was conducted to compare teachers’ ICT use, access, competence, and ICT training support on Public, Denominational, and Lay Private schools

Table 7: F and p values for Research Question four

		Sum of Squares	df	Mean Square	F	Sig.
Overall ICT use	Between Groups	.086	2	.043	.394	.675
	Within Groups	30.473	279	.109		
	Total	30.559	281			
Overall Access	Between Groups	.369	2	.184	1.128	.325
	Within Groups	45.604	279	.163		
	Total	45.973	281			
Overall Competence	Between Groups	.733	2	.366	1.501	.225
	Within Groups	68.105	279	.244		
	Total	68.837	281			
Overall Support	Between Groups	.748	2	.374	1.316	.270
	Within Groups	79.311	279	.284		
	Total	80.059	281			

Note:  $*p \leq 0.05$

There is no significant difference in teachers’ ICT use (2, 279)  $p=.68$ , access (2, 279)  $p=.33$ , competence (2, 279)  $p=.23$ , and ICT training support (2, 279)  $p=.27$  with regards to school type (Public, Denominational, and Lay Private).

**CONCLUSIONS**

The use of information and communication technologies in teaching and learning in Cameroon secondary schools has been clearly low due to: low confidence and low competencies of the teachers, formal opposition by teachers to use pedagogical tools that they were not initially trained to utilised in a professional way. Also, schools are unevenly equipped with ICT: in some schools, computers are concentrated in computer laboratories or school libraries, in others computers are only found in the staffrooms and administrative offices. Even though, there are no differences in teachers’ ICT competence and support training scores for urban and rural schools; teachers in rural area have less opportunity in using ICT in their teaching compare to their colleague in the urban areas. This is partly due no electrical connectivity in the countryside. Low teachers’ support: both pedagogical and technical other forms have dramatically led to low teachers’ use of ICTs in the teaching and learning process.

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