The use of computer based instructions to enhance Rwandan Secondary School Teachers' ICT competency and continuous professional development

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Abstract

This study intended to investigate into the extent to which computers and Internet that are being availed to schools in Rwanda can be used to enhance teachers' ICT competency and continuous professional development. In order to attain this ultimate aim, researchers undertook a Problem Solving and Theory Testing Research Design. Such a design enabled researchers to demonstrate how teachers can use computers and Internet resources to address the problems of lack of textbooks, access to updated and wide range of educational resources. These issues were highlighted in a prior field survey carried out by researchers in selected secondary schools. The theory tested is the social constructivism that values communities of practice, collaboration and learners' activities. In total, 13 teachers of Groupe Scolaire "Marie-Reine", Rwaza were voluntarily taken to a one month intensive training on the effective use of Internet as an educational source of information. The training took place in the school computer lab for a period of one month. The Computer Based Instruction combined individualized learning, group learning, peer and researchers' support strategies. Data were collected using observation forms, collection of correspondences and focus group discussion. These data were analyzed both qualitatively and quantitatively. The overall findings lead to conclude that the effective use of computers and Internet in schools increases teachers' skills and abilities to teach. Indeed, this study enables underline the role of continuous professional development in order to fulfill of the 21st century's educational imperatives in terms of teachers' competency, learners' expectations and societal needs.

Résumé

Cette étude avait pour but de s'enquerir à quel point les ordinateurs et l' Internet qui sont déjà présents dans les écoles au Rwanda peuvent être utilisé en vue de renforcer les compétences des enseignants et leur formation professionnelle continue. En vue d'attendre cette visée, les chercheurs ont emprunté l'approche Solution-Problème et Vérification de Théorie. Cette approche leur a permis de démontrer combien les enseignants peuvent utiliser des ordinateurs et des ressources d'Internet pour adresser les problèmes de manque de manuels et d'accès à de large sources d' informations actualisées. Ces problèmes avaient été évoqués lors d' une enquête préalable menée sur terrain par les chercheurs eux-mêmes dans les écoles secondaires échantillonnées. La théorie testée est celle connue sous le nom de socioconstructivisme qui est fondée sur les principes tels que la communauté d'apprentissage, la collaboration et l'activité de l'apprenant. L'en somme, 13 enseignants du Groupe Scolaire 'Marie-Reine', Rwaza ont été volontairement soumis à une formation intensive d'un mois sur l'utilisation efficace de l'Internet comme source d'informations éducatives. La formation fût conduit dans le laboratoire informatique de ladite école. Comme approche méthodologique, la formation a combiné l'apprentissage individualisé, l'apprentissage de groupe, l'apprentissage par pair et l'assistance de la part des chercheurs. Les données ont été recueillies en utilisant des formulaires d'observation, la collection de correspondances et la discussion en groupe. Ces données ont été analysées tant qualitativement que quantitativement. Les résultats ont mené à conclure que l'utilisation efficace des ordinateurs et l'Internet dans les écoles accroit les compétences et les habiletés des enseignants ainsi que leur capacités d'enseigner. En outre, ces resultats ont conduit à souligner l'importance de la formation professionnelle continue en vue de répondre valablement aux impératifs éducatifs du 21ème siècle du point de vue de la compétence des enseignants, les attentes des apprenants et les demandes de la société.

Key words*: Computer Based Instruction (CBI), Information and Communication Technology (ICT), Continuous Professional Development (CPD), Collaborative Learning (CL), Asynchronous and Synchronous Communication.*

Introduction

As time goes on, there are also new trends in education. That is how teachers today are compelled not only to learn about computers but more importantly being able to use computers to enhance their teaching and meet the essential need for continuous professional development.

In fact, various studies have confirmed that successful integration of ICT in education, skills acquisition and transfer can only be assured if teachers are also involved as key players (Carnoy, 2004). This happens while computers were identified as gadgets that may enable teachers to fulfill their needs for learning, training and empowerment. It is in this regards, that computer literacy and investment in ICT were ascertained to serve not only in teacher training but also to enrich the educational outcomes. That being, in Malaysia, aside motivation, teachers have been equipped with ICT tools and skills (Tasir, Abour, Halim, & Harun, 2012).

Truly, teachers need to be empowered and trained for the benefit of the entire education system. As a demonstration of this fact, the Australian government is reported to have allocated considerable funds ($2.4 b) with the intent to reach the Digital Education Revolution (Ng, 2011). Similarly, the Ireland government is known to have put in place a good number of policies intending to pick up the professional development of teachers all the way through their careers which impacted positively on classroom practices, methodology and students' outcomes (Banks & Smyth 2010). Indeed, a study conducted in Denmark, Finland and Norway underlined considerable efforts of these countries to endorse digital literacy and attain required readiness for the information age (Ottestad, 2010).

In Africa, a study conducted in Zimbabwe concluded that some educational challenges can be progressively alleviated if teachers' capacity building is taken among top priorities (Chitiyo & Harmon, 2009). Moreover, a study that captured Ghana, Kenya and Rwanda has shown the high government commitment to invest in ICT and their use at different levels of education (Ampofo, Bizimana, Mbuthi, Ndayambaje, Ogetta & Orodho, 2014).

In the particular context of Rwanda, efforts to equip secondary schools with computers were documented by Mukama and Andersson (2008) and the Ministry of Youth and ICT (2012). However, despite these efforts in computer provision some challenges are yet to be fixed. For instance, three distinct studies reported that computer and Internet are still underutilized (Dufatanye, 2005, Ndayambaje, Bimenyimana & Ndahayo, 2013 and Ndayambaje & Orodho, 2014) and yet the level educational resources and teacher training are yet to be pronounced satisfactory (Ndayambaje & Ngendahayo, 2006).

The purpose of the study

This study intended to investigate into the extent to which computers and Internet that are being availed to schools in Rwanda can be used to enhance teachers' ICT competency and continuous professional development.

Research questions

The study proposed to answer the following research questions:

(1) What learning strategies that participants engage in a computer-based course?

(2) To what extent the newly acquired ICT skills impact on teachers' competency?

(3) How suitable is computer based instruction to enhance teachers' continuous professional development?

Literature review

ICT competency for teachers

Regardless of the quantity and quality of technology available in classrooms, the key to how ICTs are used is the teacher. Therefore, teachers must have the competency and the right attitude towards technology (Kadel, 2005 cited in Danner & Pessu, 2013). Competency refers to "the ability to combine and apply relevant attributes to particular tasks in particular contexts. These attributes include high levels of knowledge, values, skills, personal dispositions, sensitivities, capabilities, and the ability to put those combinations into practice in an appropriate way" (Commonwealth Department of Education, Science and Training, 2002 cited in Danner & Pessu, 2013). ICT competency describes what a teacher should know so as to be able to use technology in his/her professional practice.

In today's world where technology is shaping all aspects of life, it is important to think of and highlight the core skills and competency that are required of teachers. This is because the level of a teacher's ICT literacy may affect the extent to which teachers integrate ICT in their teaching activities (Makinde, Makinde & Shorunke, 2013). Here below are the main ICT competency required of a teacher as outlined by Kirschner and Woperies (2003 cited in Danner & Pessu, 2013). These include competency in:

1. making personal use of ICT;
2. mastery of a range of educational paradigms that make use of ICT;
3. making use of ICT as minds tools;
4. using ICT as tool for teaching,
5. mastering a range of assessment paradigms which involves use of ICT; and
6. understanding the policy dimensions of the use of ICT for teaching and learning.

Moreover, UNESCO (2011) proposes a set of competency required to effectively teach with ICT, known as UNESCO's ICT Competency Framework for Teachers (see Table 1). This framework emphasizes the fact that it is not enough for a teacher to have ICT competency and be able to teach them to their students. Instead, it highlights the need for teachers to help the students become collaborative, problem-solver, creative learners through using ICT so that later lone they develop into effective citizens and members of the workforce. Moreover, the framework covers the main aspects of teacher's work and suggests three stages of teacher's development namely technology literacy, knowledge deepening, and knowledge creation.

Table 2: *The UNESCO ICT Competency framework for teachers*

	Technology Literacy	**Knowledge deepening**	**Knowledge creation**
Understanding ICT in education	Policy awareness	Policy understanding	Policy innovation
Curriculum and assessment	Basic knowledge	Knowledge application	Knowledge society skills
Pedagogy	Integrate technology	Complex problem solving	Self-management
ICT	Basic tools	Complex tools	Pervasive tools
Organisation and administration	Standard classroom	Collaborative groups	Learning organizations
Teacher professional learning	Digital literacy	Manage and guide	Teacher as model learner

Source: UNESCO (2011)

However, identifying all the skills that a teacher needs might not be an easy task as these depend of the school's particular circumstances and on individual teacher's teaching style. Also, the needed skills might change with time (Hennessy, Harrison & Wamakote, 2010).

Teachers' competency and ICT integration in education system

Effective integration of ICT in education highly relies on teachers' ICT competency, skills and positive attitudes. In a study conducted by Rastogi and Malhotra (2013), it was found out that those teachers who were competent in ICT skills proved ICT to be more useful. Indeed, these teachers were more confident, excited and less anxious. This situation becomes obvious because the assessment systems seem much more summative as observed by Hooker, Mwiyeria, & Verma (2011). In fact, the education systems tend to be examination-oriented; where even practical subjects like computer science are taught theoretically with students being drilled to pass only exams (Hooker, Mwiyeria & Verma, 2011).

Nevertheless, some reports and empirical research studies have identified a good number of challenges to the embracement of ICT in African education system. Starting by Glen, Shafika & Trucano (2007), these authors identified poor teachers' ICT skills and low competency constitute the major constraining factors of ICT integration at all levels of education in different countries of Africa. These findings corroborate with the conclusions of Omoniyi and Quadri (2013) stating that in Nigeria, secondary school teachers had low ICT competency. One of the causes of such poor ICT competency are documented by Danner and Pessu (2013) who reported that pre-service teachers in Nigeria acknowledge limited use of ICT particularly with regard to the use of internet and email.

At university level, using internet as a teaching tool is also not yet fully embraced by academic staff. This was found out in a study conducted by Tsvere, Swamy and Nyaruwata (2013) in Zimbabwe which situation looks similar to

the one investigated by Ndayambaje & Orodho (2014) in their paper from a case study of a Rwandan Higher education institution. In both cases, the underlying causes were attitudinal and managerial.

The concept of Continuous Professional Development (CPD) in education

Various authors define differently the concept of Continuous Professional Development (CPD). In this study, CPD was used to mean what educational institutions, stakeholders and teachers themselves do in order to refresh the teaching profession through the acquisition of new skills and enhancement of the old ones.

In fact, the benefits gained out of CPD do not stop to the teacher. They are translated even in effective learning and overall students' performance (Kempton, 2013). This is reemphasized by Rose and Reynolds (nd) who argue that CPD is intended neither to benefit the teacher nor the school rather primarily to enforce the quality of education within classrooms. The justification provided here is that with CPD -individually and collectively-, teachers are expected to reshape, challenge and widen their knowledge in addition to the moral raise up and more dedication to their work. Some of the major CPD models include training, coaching or mentoring, community of practice and action research (Rose & Reynolds, 2009).

Continuous Professional Development (CPD) and ICT in teacher education and teacher training

Effective teaching requires consistent hard work, commitment, relevance and update. All these attributes can only be acquired through a dynamic in-service teacher support. That is why Caena (2011) defends that teacher Continuous Professional Development is at the heart of teachers' quality and students' achievements.

With the current trends of globalization, fast moving economies and ICT invasion, teaching has been one of the highly demanding professions. This is agreed upon by Jung (2005) who translates all these facts into the need for teachers not to cease to learn especially how to handle modern technologies in their teaching.

In fact, continuous Professional Development (CPD) is one of teacher training method being used today as it constitutes an essential element for employees to feel that they are part of the institution they work for. In the particular case of teaching profession, CPD is beneficial for both individual teachers and the school as the institution. On the teachers' side it is at the heart of the establishment of professional relationships, the willing to share and learn and capacities' enhancement while on the institution's side, CPD positively impacts on school performance (Davidson, Dunlop, Soriano & Kennedy, 2012).

Moreover, CPD is argued to be of particular utility for fresh graduates as they face challenging situations related to how to exercise their theoretical knowledge into vivid school contexts. For experienced teachers even those doing well, it was found out that they still need fresh inspiration (Davidson et al. 2012) and ICT has proven to be a valuable tool for CPD in today's' shorten knowledge life. Hence, governments and educational institutions are embracing CPD as key tool towards ICT educational revolution (Davidson et al. 2012).

In a study carried by Jung (2005), it was found out that ICT holds the potentials to provide bendable and suitable alternatives for both pre and in-service teacher training. In fact, as ICT has reached the schools, Jung's study recommended that teachers be given ample opportunities to explore them, learn how to use them confidently so that these tools may support them as they teach and indirectly benefit the whole process of teaching and learning.

The fact that ICT brings about effectiveness and efficiency in teaching and learning process is indubitable (Tasir, Abour, Halim, & Harun, 2012). That is how these authors justify Asia and the Pacific countries' efforts to take primary, secondary and higher education teaching staff in ICT related training on a continuous basis. These authors go ahead to defend that the needs for ICT training arise from the evidence that ICT is now everywhere, in all sector of human and economic life, evolves so fast and hence it is common that previous acquired skills and knowledge become absolute in quite relative short time.

As far as teaching is concerned, it was revealed that ICTs are hardly manageable and hence their implementation mechanisms have to be thought of carefully (UNESCO, 2002). That is the reason why Ottestad (2010) recommends that even ICT education policies be touched to enable teachers to be properly empowered to innovate with ICT in their classrooms as some may remain conservative or reluctant to change the old pedagogical choices.

Therefore, using ICT to train teachers is reported to be most adequate as it leads teachers to change attitudes, be more technologically skilled, motivated to use the same technologies after training and enhance collaboration (Mukama & Andersson, 2008).

Theoretical framework

This study has adopted a problem solving and theory testing research design which entails that the researcher aimed at coming up with practical solutions to a specific problem (Orodho, 2009). In fact, as per initial school contacts, researchers had come to realize that although some schools had computer facilities, yet secondary school teachers complained that they are facing the challenges of *'getting sufficient and updated teaching content'*. This was in the eyes of the researchers a *problem* to be solved because nowadays computers connected to Internet constitute a repository of information that has never existed before. The theory tested is the social constructivism originated from the Russian Vygotsky as quoted by Beetham (2002). This theory emphasizes teaming among learners, individual learner motivation and the enabling environment for the effective learning to take place.

Methodology

To carry on this study, researchers proceeded first with initial consultations with the administration and teachers of six schools in Rwanda (three in the Southern Province, two in the Northern Province, and one in the City of Kigali) to enquire about their needs and readiness to host a project on the use of the Internet as an educational tool. The main criteria of readiness were the expression of interest and willingness of the school's administration and teachers to participate in the project, the availability of a computer lab and reliable internet connectivity. In the end, only one school

from the North fulfilled the criteria of readiness to host the project and expressed the need to enhance the ICT literacy of its teachers.

To suit this need, researchers designed a computer based course entitled "Internet and Online Search". The main tools used to develop the content into interlinked WebPages are Microsoft Word, Quiz Faber, Microsoft Front Page and Microsoft Clip Organizer. The course content was in French because all the participants were more conversant with French and the medium of instruction was French.

An auto-evaluation was planned at the end of each chapter so that the learner decides whether to go ahead or to go back to the ended chapter depending on his or her score which could automatically be displayed at the end of the auto-evaluation. The entire module had nine chapters with a comprehensive auto-evaluation at the end. Other features in the course included hyperlinks for further readings, stories, pictures and games that could make the learner relaxing a bit when tired.

The auto-evaluation test could generate an automatic feedback in the form of marks and the correct and wrong answers. Before moving on to the next chapter, the learner had to pass (get at least 5/10) otherwise, the learner could use the feedback to revise the chapter and try the evaluation later.

While the training module was ready after two months of intensive organization, trial and validation, the researchers re-contacted the surveyed school to ascertain their readiness to go through the training as expressed. Only Groupe Scolaire Marie-Reine-Rwaza was ready to provide required administrative and technical support (Mugenda & Mugenda, 2003).

The sample made of 13 secondary school teachers (46.4%) among 28 teaching and administrative staff of this school was constituted based on those who were most available and willing to participate (Orodho, 2009). Participants are presented as follows:

Table 2:Participants'gender

Gender	Frequency	Percent	Cumulative Percent
Male	11	84.6	84.6
Female	2	15.4	100
Total	13	100	

Table 3:Participants'marital status

Marital status	Frequency	Percent	Cumulative Percent
Single	9	69.2	69.2
Married	4	30.8	100
Total	13	100	

This sample of 13 participants was subjected to a computer based learning mode for a period of one month of June 2006. The module was installed in selected computers in the school computer lab and could be accessed offline. Apart from the two first introductory sessions, each participant took the course on his/her pace during free time in weekdays and weekend. During the training, participants could get physical or remote assistance from either researchers or peer participants.

A range of channels was in place for learners and researchers to seek and provide feedback. Apart from sending emails, making phone calls or meeting physically researchers or peer participants, researchers had devised an offline strategy to support learners. Here, each participant had identified a personal computer to use in which s/he would save under "My documents" the encountered difficulties in the name of request for assistance 1, 2, 3, etc. These files would be opened, read and replied in files named Feedback to request for assistance 1, 2, 3, etc by researchers who would check the files to collect the requests for assistance and provide feedback on a daily basis.

Data were collected all along the training using participatory observation forms (Amin, 2005) and records of correspondences being emails, sms, phone calls and files recorded offline in individual computers. In fact, the way the correspondences were recorded was well organized. Every participant had a unique identification in terms of phone number, email address and computer. Hence, it was easier to know who is who in the correspondences. Indeed, the researchers had always in hand a devised form to register occurring researchers-participant and participant-participant interactions during the training session.

The above techniques were supplemented by a focus group discussion conducted at the end of the training on the basis on the interview guide made of open ended questions. In total 10 participants over 13 managed to attend the session organized on a Saturday; a non working day and for one hour time. The core business of the focus of discussion as translated in interview guide was to learn deeply about the participants' learning experiences during the training, the particular skills acquired, challenges met, the improvements they are ready to make in teaching-learning scenarios and any further recommendation they would like to make to the school administration or any other stakeholder in education sector. The entire focus group discussion was recorded using a professional camera and audio tape recorders to enable the researchers to be actively focused on the exercise and thereafter analyze carefully the collected information.

The qualitative data as obtained from the focus group discussion and correspondences were gathered around major ideas so as to facilitate a thematic analysis. Besides, other forms of data such correspondences, assistance provided or requested, interventions during the training and attendance were put in numbers that were processed using descriptive and inferential statistics (Gay, 1992, Christensen & Stoup, 1991).

Findings and discussion

Learning strategies in an ICT led environment

As participants were compelled to combine the training and usual responsibilities within the school; they have devised a number of individual and collective strategies. These include physical contact of the researchers, calling or sending them emails. Furthermore, participants could address their queries to peer participants. On behalf of researchers, they ensured feedback to every communication, provide ample direct and distance support in terms of advice, more clarification, progress monitoring and encouragement.

Table 4: Teaching loads, recorded correspondences and engaged learning strategies in a descriptive format

	Teaching load	Number of mails sent to researchers	Number of mail feedback received from researchers	Number of phone calls addressed to researchers	Other correspondences received from researchers	Number of supports requested by peer participants	Number of supports provided to peer participants	Number of other supports directly received from researchers
Mean	21.3846	5.4615	5.4615	.5385	3.4615	5.3846	5.3846	4.0769
Std. Deviation	7.54474	2.98930	2.98930	.77625	.87706	2.75495	4.51919	1.60528
Range	25.00	9.00	9.00	2.00	2.00	8.00	15.00	5.00

From the table 4 above, it is clear that participants had an average of 21 teaching hours a week with a range of 25 hours. However, despite the individual workload, the absences in collective sessions were quite rare and none of the participants abandoned the training. This is consistent with the claim by Sang, Valcke, Braak, Tondeur & Zhu (2011) that ICT based course are likely to arouse more interest and hence motivates the learners. The same is also in line with Hammond, Reynolds & Ingram (2011) assertion that the relevance of the taught content is essential to determine learners' engagement to the task. Indeed, the fact that participants preferred more physical assistance than remote one which reemphasized the role of human interaction in the learning process as commended by Löfström and Nevgi (2008).

The findings in this study have also shown that participants had preference to request help from peer participants than directly addressing themselves to researchers. Such an attitude is highly positive as it brings more collaboration networks among learners as proven by Rose and Reynolds (-) and Löfström and Nevgi, (2008). However, such a preference of request of assistance from peer learners than researchers could not make any statistically significance. This is evidenced in table 4 below whereby at an alpha level of 0.05 two tailed test, the calculated t 1.696 at 12 degree of freedom (df) is less than 2.179 which is the critical value.

Table 4: Paired Samples Test comparing the significance in mean difference between peer participants and researchers' support

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1:	- Number of supports requested by peer participants	1.30769	2.78043	.77115	-.37250	2.98789	1.696	12	.116
Pair 2:	- Number of supports directly received from researchers								

Although researchers recognized that there is no statistical significant difference in mean supports requested from peer participants and researchers; they went ahead to inquire into the reason why participants preferred support from peer participants than researchers. On this point, participants have communicated during the focus group discussion that they felt more comfortable to address themselves to peer participants as they could talk to each other in their own jargon, mother tongue or had opportunity to continue reflect together in the staff room or at their hostels on the topics. This joins the conclusions of the study carried out by Ndayambaje (2014) in which learners revealed to have had deepen learning and seized the concepts upon discussion with peer learners in their mother tongue.

Impact of participants' characteristics on their effective learning

The findings of this study confirm the ones of Banks and Smyth (2010). They all joined up to the fact that teachers' personal characteristics determine the level of success of the continuous professional development. In fact, the findings of this study indicated that those participants who used to contact the researchers are the ones who wanted to learn beyond peer participants' discussions or even the training content itself. Hence, by engaging themselves in more readings and other learning activities embedded in the course, they became group leaders. It is such a kind of attribute that pushed the rest of the group to identify them as most skilled and hence be the most peer support providers.

Table 5 illustrates this phenomenon:

Table 5: Pearson 'r' relationship of the impact of feedback from researchers and support provision

		Number of email feedback received from researchers	Number of supports provided to peer participants
Number of feedback received from researchers	Pearson Correlation	1	.862**
	Sig. (2-tailed)		.000
	N	13	13
Number of supports provided	Pearson Correlation	.862**	1
	Sig. (2-tailed)	.000	
	N	13	13

**. Correlation is significant at the 0.01 level (2-tailed).

The discussion of the table 5 above leads therefore to confirm that learners' characteristics impact on the learning effectiveness. This is supported by the fact at 0.01 (2-tailed) significant level the computed Pearson Product Moment Correlation Coefficient (r) has given a very high positive (0.862) correlation between the two variables. Such an inference is consistent with Rodríguez, Nussbaum and Dombrovskaia (2012) findings which underlined that the nature of learners is even expressed in the way they handle challenges, innovate or practice.

In line with participants' gender, it was observed that women although few in number (15.4% of the participants) still, they have been the most support seekers. This is portrayed in table 6:

Table 6: Point-Biserial Correlation Coefficient (rpb) between support request and gender

		Number of supports requested	Participants' gender
Number of supports requested	Point-Biserial Correlation	1	.421**
	Sig. (2-tailed)		.152
	N	13	13
Participants' gender	Pearson Correlation	.421	1
	Sig. (2-tailed)	.152	
	N	13	13

**. Correlation is significant at the 0.01 level (2-tailed).

The analysis of the table 6 above leads to confirm the existence of a moderate relationship between gender and support request. In fact, at an alpha level of 0.01 (2-tailed), the computed Point Bi-serial Correlation Coefficient is moderate (0.421). The fact that women were the most challenged in ICT related matter is also supported by Nasah, DaCosta, Kinsell and Seok (2010). One of the reasons highlighted during the focus group

discussion is that women tend not to dedicate much time trying this and that due either to heavy family responsibilities or natural limited interest; a point concurring with the study carried on by Ilomäki (2011).

The effect of computer based instruction on teachers' competency and Continuous Professional Development

All along the study, researchers came out to collect data that confirmed that ICT supported training towards an ICT related skills empowerment has contributed not only to substantiate the training itself but also empowered participants with immediate and future skills (Löfström & Nevgi, 2008) that solve their teaching challenges. In this regards, one of the participants communicated: "*for sure this has been my special opportunity to use the computer independently. Before, I would meet a computer put on by the lab attendant or the manager of cyber café. But with this course, I would come alone run my computer, use it and switch it off before I leave*". This statement recalls the recommendation of Jung (2005) on how effectively betterment ICT literacy and confidence to use a computer.

Moreover, with this study, 84.6 % of the participants communicated that they have been able to manage their inbox interface (reading, replying, forwarding and saving email in folders), to make selective advanced Google search, to use Social and Subject Based Information Gateways and access free online journals/books to supplement their teaching content with more trustworthy and current materials/ illustrations. Therefore, it is with no doubt that with such online sources which were still unknown to them; they ended up by enhancing their teaching and as a result positively affect students' achievements (Caena, 2011, Quintana, Pujol & Romanı´, 2012). Indeed, such new skills coupled with the institutional punctual support might have impacted positively on school outputs and students' learning process as found out in others studies such as Kempton (2013), Huang, et al. (2010) and Livingstone (2012).

Conclusion

The overall findings from this study lead to conclude that as key players of education, teachers need to be adequately and continuously trained in order to overcome the evolving challenging tasks of the teaching profession. This shall therefore constitute one of the assurances to reach the relevance and quality of education that learners, parents, governments and further stakeholders are always seeking for.

With the contemporary ICT trends, teaching ICT or teaching with/through ICT requires of the teacher relevant skills and confidence. These can only be acquired if teachers adopt a positive attitude to learn throughout their teaching carrier because technological innovations and practices shall continue emerging. Furthermore, educational standards shall always be raised to meet the increasing global trends.

In the end, this study suggests that further studies be carried on how the availability of online resources impacts on teaching-learning outputs. Indeed, further researchers may investigate into the effect of ICT competency on teachers' performance.

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