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Information and Communication Technology Readiness of Teachers in Cebu, Philippines

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ABSTRACT

The readiness of teachers in Information and Communication Technology (ICT) is essential not only in teaching and learning practice but also in professional growth and development. The study determined the Information and Communication Technology Readiness of Teachers in Cebu, a basis to propose an ICT development plan for teachers of the different private and public Higher Education Institutions (HEIs). The output of this study is a guide for both teachers and administrators on how to improve the ICT skills of teachers through the proposed plan that would help them develop their knowledge and expertise. The descriptive method was utilized, and a two-part survey-questionnaire from the Commission on Higher Education (CHED) – Philippine Higher Education Research Network (PHERNet) was used in gathering data from 182 teachers of 40 HEIs in the province of Cebu, which was analyzed and interpreted. Frequency, simple percentage, weighted mean, and Chi-square were used in the treatment of data. Results showed that majority of the respondents own mobile and personal desktop computers. The ICT readiness of Cebu teachers is at moderate level. Gender and Civil Status are significantly related to their ICT readiness. The researchers developed an ICT plan to equip teachers with sufficient knowledge and skills for global education. It is recommended that the aforementioned plan be used in the different HEIs in Cebu City.

Keywords: *teacher education, ICT competence, descriptive design, smartphone*

INTRODUCTION

Information and Communication Technology (ICT) refers to tools and technologies that provide access to information using telecommunications, which includes the Internet, smartphones, and other communication media. These ICT tools are used in education as devices that assist teachers in the delivery of their lessons (Attewell, 2005; Reynolds, Treharne, and Tripp, 2003). ICT also makes

their classes interactive and enjoyable. Likewise, teachers can easily explain complicated instructions thus ensure students' comprehension. However, many HEIs in the Philippines, specifically in the Province of Cebu have limited ICT resources that hinder teachers from the use of advanced ICT technologies that may affect the ICT readiness of teachers. The higher the apparent handiness and convenience, the more chances there are in utilization of the technology. It can be reasoned that teachers in Region VII unequivocally embrace the technology teaching and learning exercises. Similarly, this technology may help in the change of the ICT competency level of the teachers in the region (Marcial and Arcelo, 2016).

The HEIs are mandated by CHED to improve the quality of teaching and their curricular offerings through re-engineering and integrating ICT into their curriculum. Acquisition of ICT tools as well as enhancing their faculty qualifications through continuing professional education and attending seminars and workshops are needed. With this, the school administrators must evaluate and supervise if these requirements are met.

Teachers in the College of Teacher Education program must be ready to adopt these ICT tools as media in enhancing their teaching practice. The introduction of ICT presents new challenges for teachers and is welcomed with the belief that ICT, like other innovations, can cause several in the school (Donnelly, McGarr, and O'Reilly, 2011; Kalogiannakis, 2010; Hennessy, Ruthven, and Brindley, 2005).

Although there have been many education reforms regarding teachers' training policy in recent years and the number of training programs has been increased, they have not been able to satisfy teachers' needs to a substantial degree (Kalogiannakis, 2010; Saiti and Saitis, 2006). Teachers' computer acceptance is a critical factor to the successful use of computers in education (Teo, 2009; Van Raaij and Schepers, 2008; Yuen and Ma, 2002). Thus, there is a need to examine the factors affecting teachers' computer use and its implications to teachers' professional development strategies (Kumar, Rose, and D'Silva, 2008; Russell, Bebell, O'Dwyer, and O'Connor, 2003; Mumtaz, 2000).

It is on these reasons that the ICT competence of the faculty of the College of Teacher Education was studied by Pardo (2011) to provide basis in planning for instructional development. She found out that the younger faculty of the College of Teacher Education in the University of Northern Philippines have attended more in-service trainings and experiences in using ICT, and they tend to have better access, and higher competence.

The studies above suggest a variety of types of professional development, as well as a range of infrastructural options. They are needed to meet not only the varying needs of individual teachers but also the different ways in which ICT can be used (Ward and Parr, 2010; Ramsden, 2003). The critical outcomes for any professional development must increase teachers' confidence in their ability to facilitate student learning with computers, along with the provision of stronger

pedagogical motivation for teachers to integrate ICT (Hiralaal, 2013; Ward and Parr, 2010; Hardcastle, Bamblett, and Owens, 2003). The majority of the stakeholders believe that lack of in-service training, lack of appropriate software and materials, and lack of hardware are the main barriers for integrating ICTs in pre-service teacher education programs (Goktas, Yildirim and Yildirim, 2009).

The use of ICT in schools showed that they are favorable towards the integration of technology into classroom instruction. Training, therefore, should be offered to teachers on a continuous, rather than a one-off, basis so that their IT knowledge is upgraded over time. It is indeed hoped that the benefits from the use of ICTs can be fully realized and optimized in teaching (Lau and Sim, 2008).

In Hong Kong, teachers are not very prepared to use e-learning technologies for teaching and learning. There are differences in readiness perceived between male and female, secondary school teachers, and elementary teachers, and teachers of different high schools of various bindings (So and Swatman, 2006; Keung and So, 2005).

The study of Mutula and Van Brakel (2007) characterized the ICT sector concerning among other things; the skills needed in the area to power the emerging digital economy. ICT, particularly the Internet, is having a significant impact on the operations of business enterprises and is claimed to be essential for the survival and growth of nations' economies (Berisha-Namani, 2009; Mutula and Van Brakel, 2007).

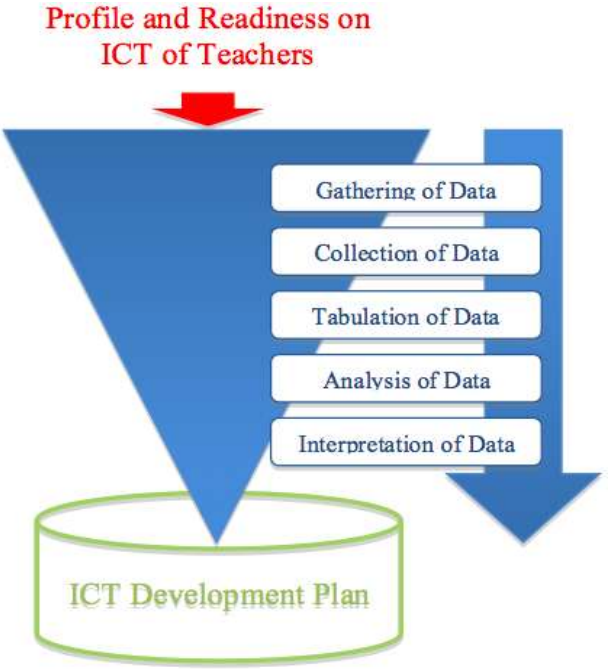

Figure 1. Framework of the study

The inputs of the study are the profile as well as the ICT readiness of teachers. After identifying the input variables, the data were gathered, collected, tabulated, analyzed, and interpreted using some statistical tools. An ICT development plan was proposed to improve the professional growth and development of teachers.

The study determined the Information and Communication Technology Readiness of Teachers in the College of Teacher Education of selected HEIs in the Province of Cebu, Philippines. Specifically, this study attempted to: 1) identify the profile of the respondents such as gender, civil status, highest educational attainment, and affiliation; 2) determine the technology ownership of the respondents; 3) determine their level of ICT readiness as to: portable learning management system (PLMS) and mobile app for teachers (m-APP) 4) determine the significant relationship between profile and ICT readiness of respondents and 5) design an ICT plan for administration to use.

METHODOLOGY

This study used the descriptive type of research. It was conducted at the different teacher education programs in selected colleges and universities in the Province of Cebu, Philippines. The researchers utilized the survey questionnaires on ICT Integration of Teacher Education in Region VII of Silliman University through PHERNet. The standardized questionnaire, which was the benchmark for the United Nations Educational, Scientific, and Cultural Organization, was composed of two parts. The first part of the questionnaire was administered to obtain the profile of the respondents such as gender, civil status, highest educational attainment, type of school where respondents were affiliated, and the kinds of technology those respondents own. The second part of the questionnaire was administered to obtain the ICT readiness of teachers as to portable learning management system, and mobile app for teachers. The 182 faculty teaching the core curriculum in the College of Teacher Education of the 40 private, state, and local colleges and universities were used as respondents of the study. The statistical treatments utilized in the data analysis were simple percentage, weighted mean, and Chi-square.

The following were norms used in the Study:

PLMS

Mean Range	**Descriptive Rating**
6.14-7.00	Likely Extreme
5.29-6.13	Likely Quite
4.43-5.28	Likely Slight
3.47-4.42	Neither
2.71-3.46	Unlikely Slight
1.86-2.70	Unlikely Quite
1.00-1.85	Unlikely Extreme

m-APP

Mean Range	**Descriptive Rating**
6.14-7.00	Likely Extreme
5.29-6.13	Likely Quite
4.43-5.28	Likely Slight
3.47-4.42	Neither
2.71-3.46	Unlikely Slight
1.86-2.70	Unlikely Quite
1.00-1.85	Unlikely Extreme

Overall Mean Range	**Overall Descriptive Rating**
6.14-7.00	Very High
5.29-6.13	High
4.43-5.28	Moderate
3.47-4.42	Slightly Low
2.71-3.46	Low
1.86-2.70	Very Low
1.00-1.85	Extremely Low

RESULTS AND DISCUSSION

Table 1 shows that most of the respondents are females, married, and are master's degree holders. More respondents come from the private sector.

Table 1
Profile of Cebu Teachers

	f	%
Gender		
Male	43	23.63
Female	126	69.23
No Response	13	7.14
Total	**182**	**100.00**
Civil Status		
Single	48	26.37
Married	116	63.74
Widowed	5	2.75
Others	3	1.65
No Response	10	5.49
Total	**182**	**100.00**
Highest Educational Attainment		
Doctoral	23	12.64
Masters	54	29.67
Baccalaureate	26	14.29
No Response	79	43.41
Total	**182**	**100.00**
Affiliation		
Private	113	62.09
Public	69	37.91
Total	**182**	**100.00**

The data imply that married female teachers whose qualifications met the minimum requirements as set by CHED dominate the teaching profession. This result conforms to the study of Pardo (2012) that the CTE faculty are female dominated and master's degree holders.

The study of Dove and Honigsfeld (2010), Katzenmeyer and Moller (2009), Prensky (2005), and Delacruz (2004) revealed that the ICT readiness of teachers is influenced by educational qualifications, their eagerness to learn and adopt the emerging technologies, and the development plan prepared by the school administrators.

Table 2 shows that majority of the respondents own personal desktop computers (PCs) at home, have at least a smartphone and even laptop PCs. The table also reveals that more than half of the respondents do not have tablet PCs.

Table 2
Technology Ownership of Cebu Teachers

	f	*%*
The desktop computer at home		
Yes	*129*	*70.88*
No	*44*	*24.17*
No Response	*9*	*4.95*
Total	***182***	***100***
Smartphone ownership		
Yes	*97*	*53.30*
No	*57*	*31.32*
No Response	*28*	*15.38*
Total	***182***	***100***
Tablet computer		
Yes	*41*	*22.52*
No	*98*	*53.85*
No Response	*43*	*23.63*
Total	***182***	***100***
Laptop computer		
Yes	*131*	*71.98*
No	*46*	*25.27*
No Response	*5*	*2.75*
Total	***182***	***100***

The data imply that respondents acknowledge the need for these technologies in the teaching-learning process. The integration of Science and Technology into educational practices has created a new avenue for learning new paradigms in teaching students. The availability of comprehensive information on the Internet and the technological advancement help teachers in the delivery of lessons making it enjoyable. Thus, there is a need for teachers to be competent and knowledgeable of such technology, which is being integrated into the school curriculum in many colleges and universities across the country as a result of active staff development (Etcuban, 2013). The professional technology development for teachers reveals that there is a long way to go in understanding methods of active practice on the various impacts of these activities on teaching and learning (Lawless and Pellegrino, 2007; Brinkerhoff, 2006). They need to study on how technology integration occurs within schools, what increases its adoption by teachers, and the long-term impacts that these investments have on both teachers and students (Levin and Wadmany, 2008; Penuel, 2006; Zhao and Frank, 2003; Darling-Hammond, 2000).

Table 3 below shows that the teachers' ICT readiness on PLMS fall into moderate ($\overline{X}$ = 5.28) category and find useful in their jobs ($\overline{X}$ = 5.56). The data reveal that respondents are interested in the use of the PLMS as means of improving their teaching tasks, making it easier for them to deliver their lessons effectively and efficiently.

Table 3
Level of ICT Readiness of Cebu Teachers in the use of Portable Learning Management System (PLMS)

No.	ICT Readiness	Weighted Mean	Descriptive Rating
1.	Using the PLMS in my job would enable me to accomplish tasks more quickly.	5.37	Likely quite
2.	Using PLMS would improve my job performance.	5.43	Likely quite
3.	Using PLMS in my job would increase my productivity.	5.51	Likely quite
4.	Using PLMS would enhance my effectiveness on the job.	5.45	Likely quite
5.	Using PLMS would make it easier to do my job.	5.54	Likely quite
6.	I would find PLMS useful in my job.	5.56	Likely quite
7.	Learning to operate PLMS would be easy for me.	5.04	Likely slight
8.	I would find it easy to get PLMS to do what I want to do.	5.03	Likely slight
9.	My interaction with PLMS would be clear and understandable.	5.07	Likely slight
10.	I would find PLMS to be flexible to interact with.	5.20	Likely slight
11.	It would be easy for me to become skillful at using PLMS.	5.11	Likely slight
12.	I would find PLMS easy to use.	5.04	Likely slight
	Overall	**5.28**	**moderate**

The PLMS provides an excellent avenue for teachers in enhancing their teaching skills through the utilization of Web-based application designed to make teaching and learning fun and enjoyable. Marcial (2011) says that the increasing role and demands of information technology (IT) in the development of an organization calls for an intense reaction to the challenges of the information society. IT plays a significant impact in the HEIs in the Philippines; however, they are technologically challenged of keeping abreast with the latest trend and development in IT.

Table 4 below reveals that respondents are eager to maximize the use of their smartphones by adapting the Android technology as a medium for the delivery of their lessons. Acknowledging the fact that most of the respondents possess mobile gadget that runs in Android environment, they are confident that this mobile technology would enable them to improve their job performance (5.46) and increase their productivity ($\bar{X}$=5.46).

Overall, the ICT readiness of Teachers in the use of the mobile app (m-App) is at moderate ($\bar{X}$ =5.26) level. This implies that there is a need to motivate the respondents and to ignite their interest as it is not easy for them to use m-App ($\bar{X}$ =5.07).

Table 4
Level of ICT Readiness of Cebu Teachers in the Use of the Mobile app (m-APP)

#	ICT Readiness	Weighted Mean	Descriptive Rating
1.	Using the m-APP in my job would enable me to accomplish tasks more quickly.	5.42	Likely quite
2.	Using m-APP would improve my job performance.	5.46	Likely quite
3.	Using m-APP in my job would increase my productivity.	5.46	Likely quite
4.	Using m-APP would enhance my effectiveness on the job.	5.42	Likely quite
5.	Using m-APP would make it easier to do my job.	5.38	Likely quite
6.	I would find m-APP useful in my job.	5.42	Likely quite
7.	Learning to operate m-APP would be easy for me.	5.08	Likely slight
8.	I would find it easy to get m-APP to do what I want to do.	5.09	Likely slight
9.	My interaction with m-APP would be clear and understandable.	5.11	Likely slight
10.	I would find m-APP to be flexible to interact with.	5.16	Likely slight
11.	It would be easy for me to become skillful at using m-APP.	5.12	Likely slight
12.	I would find m-APP easy to use.	5.07	Likely slight
	Overall	**5.26**	**moderate**

The opportunities and challenges are emerging for learners, teachers and institutions from the increasing availability of low-cost mobile and wireless devices and associated infrastructure (Chan, Roschelle, Hsi, Kinshuk, Sharples, Brown, and Hoppe, 2006; Cobcroft, Towers, Smith, and Bruns, 2006). Mobile learning can provide learners with the maximizing learning autonomy, and also can provide the instructors and education administrators with more flexible teaching and managing methods (Keengwe and Kidd, 2010; Jin, 2009). Mobile learning would one day provide education that is truly independent of time and place and facilitated by portable computers capable of providing rich interactivity, full connectivity, and robust processing (Corbeil and Valdes-Corbeil, 2007). Kukulska-Hulme and Traxler (2007) say that mobile learning is a new way of learning. Mobile devices including handheld computers, mobile phones, and smartphones make learning portable, spontaneous, personal and exciting.

Table 5 shows that the ICT readiness of the respondents in the use of the PLMS has a significant relationship with their civil status. This implies that single faculty members easily adjust in the use of m-APP, it could be that they are more interested to modern technology because they want to explore more and they do not have a family which means more time and lesser obligations than the married ones. Furthermore, their ICT readiness in the use of m-APP has significant relationship with their gender and their civil status.

Table 5
Correlation Coefficients showing the Relationship between Profile and ICT Readiness of Respondents

	Computed Chi-Square	Critical Value	df	Significance
PLMS				
Gender	18.31	21.03	12	Not Significant
Civil Status	45.07	36.42	24	Significant
Highest Educational Attainment	13.16	28.87	18	Not Significant
Affiliation	4.83	12.59	6	Not Significant
m-APP				
Gender	25.29	21.03	12	Significant
Civil Status	59.38	36.42	24	Significant
Highest Educational Attainment	22.17	28.87	18	Not Significant
Affiliation	2.02	12.59	6	Not Significant

These data imply that single and male respondents can easily adapt to these emerging technologies if they are surrounded by people who have the know-how in the use of technologies like the Internet and smartphones. These people might be their children or their students who are directly interacting with the respondents.

The study of Ismail, Bokhare, Azizan, and Azman (2013) uncovered that the level of technology acceptance among male teachers as far as awareness and motivation is high. Despite this positive acknowledgment of technology, teachers' awareness for the utilization of mobile phone in teaching and learning is observed to be at an extensively low level. The study distinguished a significant correlation between teachers' awareness and motivation towards innovation with their readiness for the educational utilization of mobile phone. Also, It was revealed that gender is a possible factor influencing the teachers' readiness in the use of the mobile app in teaching and learning.

Mobile learning environments must also cater for different user preferences and various devices with limited capability, where not all of the information is relevant and critical to each learning environment (Wong and Looi, 2011; Koole and Ally, 2006). Wheeler, Miller, Halff, Fernandez, Gibson, and Meyer (2011) in the results of their study indicated that web place is a useful tool in teaching and motivating the students.

Studies showed that students' behavior, civil status, technology or system, and interactive application are the factors influencing the readiness of the m-learning adoption (Irby and Strong, 2013; Cheon, Lee, Crooks, and Song, 2012; Poon and Koo, 2010). Most learners prefer online learning, but online learning does not outperform traditional face-to-face classroom students (Zhang, Zhao, Zhou, and Nunamaker Jr, 2004; Swan, 2003; Diaz, 2002). However, most students are willing to try out mobile learning.

Proposed ICT Development Plan

After the completion of this study, the researchers designed a development plan that bridge between the school's present practice with ICT and the institution's vision, mission, goals and objectives. The parts include the Introduction, Objectives/targets to bring about improvement, Success Criteria, Actions to bring about improvement, Time/materials/ staff development including costs, Staff/Lead responsibility, Timescale, Monitoring and evaluation. The core areas included the development of resources (infrastructure and digital content), professional development (ICT use and pedagogy), and curriculum development (ICT capability and ICT use in subjects).

CONCLUSIONS

Majority of the respondents are females, married and are affiliated in private institutions. A mark percentage of the respondents finished master's degree. Majority of them have personal desktop computer and smartphone. ICT Readiness of Cebu Teachers on PLMS and M-APP is at moderate level. There is a significant relationship between ICT Readiness of the respondents (PLMS) and their civil status .There is also a significant relationship between ICT Readiness of the respondents (M-APP) and their gender and civil status. An ICT development plan was developed to address the moderate level of ICT Readiness of Cebu Teachers.

RECOMMENDATIONS

The researchers strongly recommend that the ICT development plan for teachers be used in the different HEIs in the province of Cebu, Philippines.

LITERATURE CITED

Attewell, J. (2005). From research and development to mobile learning: Tools for education and training providers and their learners. In 4th World Conference on mLearning (pp. 1-6). Retrieved on October 5, 2015 from http://www.mlearn.org/mlearn2005/CD/papers/Attewell.pdf

Berisha-Namani, M. (2009). The role of information technology in small and medium-sized enterprises in Kosova. In the Fulbright Academy Conference. Retrieved on October 5, 2015 from http://goo.gl/KOWfoc

Brinkerhoff, J. (2006). Effects of a long-duration, professional development academy on technology skills, computer self-efficacy, and technology integration beliefs and practices. Journal of Research on Technology in Education, 39(1), 22-43. Retrieved on October 5, 2015 from http://goo.gl/OwCrSw

Chan, T. W., Roschelle, J., Hsi, S., Kinshuk, Sharples, M., Brown, T. and Hoppe, U. (2006). One-to-one technology-enhanced learning: An opportunity for global research collaboration. Research and Practice in Technology Enhanced Learning, 1(01), 3-29. Retrieved on October 3, 2015 from http://goo.gl/bKnPTt

Cheon, J., Lee, S., Crooks, S. M. and Song, J. (2012). An investigation of mobile learning readiness in higher education based on the theory of planned behavior. Computers and Education, 59(3), 1054-1064. Retrieved on October 26, 2015 from http://goo.gl/IySu1

Cobcroft, R. S., Towers, S. J., Smith, J. E. and Bruns, A. (2006). Mobile learning in review: Opportunities and challenges for learners, teachers, and institutions. Retrieved on February 6, 2014 from http://eprints.qut.edu.au/5399/

Corbeil, J. R. and Valdes-Corbeil, M. E. (2007). Are you ready for mobile learning? Retrieved on February 10, 2014 from http://goo.gl/oZDSXb

Darling-Hammond, L. (2000). Teacher quality and student achievement. Education policy analysis archives, 8, 1. Retrieved on October 12, 2015 from http://goo.gl/xFG5iY

Delacruz, E. (2004). Teachers' working conditions and the unmet promise of technology. Studies in Art Education, 6-19. Retrieved on October 12, 2015 from http://goo.gl/0J182i

Diaz, D. P. (2002). Online drop rates revisited. The Technology Source, 3. Retrieved on October 12, 2015 from http://goo.gl/P59nsn

Donnelly, D., McGarr, O. and O'Reilly, J. (2011). A framework for teachers' integration of ICT into their classroom practice. Computers and Education. Retrieved on October 12, 2015 from http://goo.gl/fWlrB4

Dove, M. and Honigsfeld, A. (2010). ESL coteaching and collaboration: Opportunities to develop teacher leadership and enhance student learning. TESOL Journal, 1(1), 3-22. Retrieved on October 16, 2015 from http://goo.gl/X5ULJy

Etcuban, J. O. (2013). Professional and ICT efficacy plan of instructors based on their training needs at the University of Cebu campuses, Philippines. IAMURE International Journal of Multidisciplinary Research, 5(1). Retrieved on February 8, 2016 from https://goo.gl/Q1qVTD

Goktas, Y., Yildirim, S. and Yildirim, Z. (2009). Main barriers and possible enablers of ICTs Integration into pre-service teacher education programs. Journal of Educational Technology and Society, 12(1). Retrieved on March 8, 2015 from http://goo.gl/RaliIs

Hardcastle, L., Bamblett, E. and Owens, J. (2003). Effective use of information and communication technology (ICT) to enhance learning for disadvantaged school students. Department of Education, Science, and Training. Retrieved on October 12, 2015 from http://goo.gl/PVLS3C

Hennessy, S., Ruthven, K. and Brindley, S. (2005). Teacher perspectives on integrating ICT into subject teaching: Commitment, constraints, caution, and change. Journal of Curriculum Studies, 37(2), 155-192. Retrieved on October 16, 2015 from http://goo.gl/voUDbs

Hiralaal, A. (2013). ICT in Practice at the Durban University of Technology. Proceedings of the 8th International Conference on e-Learning. Retrieved on October 16, 2015 from https://goo.gl/jaiBha

Irby, T. L. and Strong, R. (2013). Agricultural education students' acceptance and self-efficacy of mobile technology in classrooms. NACTA Journal, 57(1), 82. Retrieved on October 8, 2015 from http://goo.gl/2zN9J3

Ismail, I., Bokhare, S., Azizan, S. and Azman, N. (2013). Teaching via mobile phone: A case study on Malaysian teachers' technology acceptance and readiness. Journal of Educators Online, 10(1), 1-38. Retrieved July 2018 from https://www.learntechlib.org/p/114391/

Jin, Y. (2009). Research of one mobile learning system. In Wireless Networks and Information Systems. Retrieved on February 8, 2014 from http://goo.gl/8U0ytc

Jung, I. (2005). ICT-pedagogy integration in teacher training: application cases worldwide. Journal of Educational Technology and Society, 8(2), 94-101. Retrieved on October 6, 2015 from https://goo.gl/1bg1Vx

Kalogiannakis, M. (2010). Training with ICT for ICT from the trainee's perspective. A local ICT teacher training experience. Education and Information Technologies. Retrieved on February 8, 2014 from http://link.springer.com/article/10.1007/s10639-008-9079-3

Katzenmeyer, M. and Moller, G. (2009). Awakening the sleeping giant: Helping teachers develop as leaders. Corwin Press. Retrieved on October 6, 2015 from https://goo.gl/xpbPhZ

Keengwe, J. and Kidd, T. T. (2010). Towards best practices in online learning and teaching in higher education. MERLOT Journal of Online Learning and Teaching, 6(2), 533-541. Retrieved on October 8, 2015 from http://jolt.merlot.org/vol6no2/keengwe_0610.htm

Keung, K. and So, T. (2005). The e-learning readiness of teachers in Hong Kong. In Advanced Learning Technologies. Retrieved on October 8, 2015 from http://goo.gl/szCNie

Koole, M. and Ally, M. (2006). Framework for the rational analysis of mobile education (FRAME) model: Revising the ABCs of educational practices. In Networking, International Conference on Systems and International Conference on Mobile Communications and Learning Technologies (pp. 216-216). Retrieved on October 8, 2015 from http://goo.gl/HcCsQ3

Kukulska-Hulme, A. and Traxler, J. (2007). Mobile learning: A handbook for educators and trainers. Retrieved on February 8, 2014 from http://goo.gl/YpQA90

Kumar, N., Rose, R. C. and D'Silva, J. L. (2008). Teachers' readiness to use technology in the classroom: An empirical study. European Journal of Scientific Research, 21(4), 603-616. Retrieved on February 16, 2014 from http://goo.gl/ItiFwY

Lau, B. T. and Sim, C. H. (2008). Exploring the extent of ICT adoption among secondary school teachers in Malaysia. International Journal of Computing and ICT Research, 2(2), 19-36. Retrieved on February 16, 2014 from http://www.ijcir.org/volume2-number2/article3%2019-36.pdf

Lawless, K. A. and Pellegrino, J. W. (2007). Professional development in integrating technology into teaching and learning: Knowns, unknowns, and ways to pursue better questions and answers. Review of educational research, 77(4), 575-614. Retrieved on February 6, 2014 from http://jotlt.indiana.edu/article/view/4093

Levin, T. and Wadmany, R. (2008). Teachers' views on factors affecting effective integration of information technology in the classroom: Developmental scenery. Journal of Technology and Teacher Education, 16(2), 233-263. Retrieved on October 2015 from http://www.editlib.org/p/22950/

Marcial, D. E. (2012). Information technology resources in higher education institutions in the Philippines. Philippine Information Technology Journal, 5 (1). Retrieved on April 8, 2016 from shorturl.at/diyBR

Marcial, D. E. and Arcelo, A. Q. (2016). Perceptions and Prioritization of a Portable Learning Management System. In International Conference on Research in Social Sciences, Humanities and Education. Retrieved on July 9, 2018 from https://goo.gl/8RhYA9

Mumtaz, S. (2000). Factors affecting teachers' use of information and communications technology: a review of the literature. Journal of information technology for teacher education, 9(3), 319-342. Retrieved on October 8, 2015 from http://goo.gl/RaUwgY

Mutula, S. M. and Van Brakel, P. (2007). ICT skills readiness for the emerging global digital economy among small businesses in developing countries: Case study of Botswana. Library Hi Tech. Retrieved on February 8, 2014 from http://goo.gl/F4KtdP

Pardo, C. G. (2012). Information and Communication Technology Competence of the University of Northern Philippines - college of teacher education faculty. UNP Research Journal XXI, 144-161 Retrieved on March 8, 2015 from http://journal.unp.edu.ph/index.php/unprj/article/view/19/0

Penuel, W. R. (2006). Implementation and effects of one-to-one computing initiatives: A research synthesis. Journal of Research on Technology in Education, 38(3), 329-348. Retrieved on October 11, 2015 from http://goo.gl/GcjVxt

Poon, W. C. and Koo, A. C. (2010). Mobile learning: The economics perspective. International Journal of Innovation and Learning, 7(4), 412-429. Retrieved on February 6, 2014 from http://inderscience.metapress.com/content/rvvk75436258202t/

Prensky, M. (2005). What can you learn from a cell phone? Retrieved on October 13, 2015 from https://goo.gl/FYo9wZ

Ramsden, P. (2003). Learning to teach in higher education. Retrieved on October 13, 2015 from https://goo.gl/DJGi2q

Reynolds, D., Treharne, D. and Tripp, H. (2003). ICT—the hopes and the reality. *British Journal of Educational Technology*, 34(2), 151-167. Retrieved on October 13, 2015 from http://onlinelibrary.wiley.com/doi/10.1111/1467-8535.00317/abstract

Russell, M., Bebell, D., O'Dwyer, L. and O'Connor, K. (2003). Examining teacher technology use implications for preservice and inservice teacher preparation. Journal of Teacher Education, 54(4), 297-310. Retrieved on October 12, 2015 from https://goo.gl/CoidFj

Saiti, A. and Saitis, C. (2006). In-service training for teachers who work in full-day schools. Evidence from Greece 1. European Journal of Teacher Education, 29(4), 455-470. Retrieved on October 13, 2015 from http://goo.gl/6pVfBy

So, T. and Swatman, P. M. (2006). E-Learning readiness of Hong Kong teachers. Retrieved on October 13, 2015 from http://goo.gl/VJSLMZ

Swan, K. (2003). Learning effectiveness online: What the research tells us. Elements of Quality Online Education, Practice and Direction, 4, 13-47. Retrieved on October 13, 2015 from http://goo.gl/5QrF3T

Teo, T. (2009). Modelling technology acceptance in education: A study of pre-service teachers. Computers and Education. Retrieved on October 11, 2015 from http://www.sciencedirect.com/science/article/pii/S0360131508001358

Van Raaij, E. M. and Schepers, J. J. (2008). The acceptance and use of a virtual learning environment in China. Retrieved on October 11, 2015 from http://www.sciencedirect.com/science/article/pii/S0360131506001382

Ward, L. and Parr, J. M. (2010). Revisiting and reframing use: Implications for the integration of ICT. Retrieved on February 12, 2014 from https://goo.gl/DhnDHa

Wheeler, J. L., Miller, T. M., Halff, H. M., Fernandez, R., Halff, L. A., Gibson, E. G. and Meyer, T. N. (2011). Web places: Project-based activities for at-risk youth. Retrieved on February 12, 2014 from http://cie.asu.edu/ojs/index.php/cieatasu/article/viewArticle/830

Wong, L. H. and Looi, C. K. (2011). What seams do we remove in mobile-assisted seamless learning? Retrieved on October 12, 2015 from http://goo.gl/fiodM

Yuen, A. H. and Ma, W. W. (2008). Exploring teacher acceptance of e-learning technology. Asia-Pacific Journal of Teacher Education, 36(3), 229-243. Retrieved on October 12, 2015 from http://goo.gl/i8g8A6

Yuen, A. H. and Ma, W. W. (2002). Gender differences in teacher computer acceptance. Journal of Technology and Teacher Education, 10(3), 365-382. Retrieved on October 5, 2015 from http://www.editlib.org/p/15142/

Zhang, D., Zhao, J. L., Zhou, L. and Nunamaker Jr, J. F. (2004). Can e-learning replace classroom learning? Retrieved on October 5, 2015 from http://dl.acm.org/citation.cfm?id=986216

Zhao, Y. and Frank, K. A. (2003). Factors affecting technology uses in schools: An ecological perspective. American Educational Research Journal, 40(4), 807-840. Retrieved on October 11, 2015 from http://aer.sagepub.com/content/40/4/807.short

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