

## ***Bridging Technological Uncertainties: Fostering Globalized Higher Education***

Maria Theresa Pelones, Mindanao State University & General Santos City,  
Philippines  
Aida Docena, Mindanao State University & General Santos City, Philippines

The IAFOR Conference for Higher Education Research- Hong Kong 2019  
Official Conference Proceedings

### **Abstract**

Quality education plays a pivotal role for faculty in pursuit of technological advancement to become competent, resilient, productive and globalized individuals in this volatile, uncertain, fast-changing, and ambiguous world of education. The digital divide is getting wider and failure to meet the demand would mean deepening the gap between learners, students, and its learning environment. In General Santos City, the Philippines the study dwells on how the tertiary schools both private and state university is taking the challenge in providing adequate technological equipment and globalized competent faculty ready to embrace the 21st-century schools. The study revealed that the ratio of school and computer laboratory is 1:4, with an average of 110 computer units per laboratory and with 10 regular laptops intended for faculty use in ICT classroom integration. The laboratories have adequate technological equipment and facilities which are necessary for the full functioning of the computer operations & programs. In terms of connectivity, tertiary schools have an average of 100 units connected to the internet with a speed ranging from 30mbps-100mbps only and were connected using Fiber optic. faculty in the tertiary was also found to be moderately competent in basic computer literacy and ICT integration in the classroom while they are highly competent in information literacy. It is evident that most of the tertiary schools don't have specific continuing programs or short courses for faculty instead capability building needs to be requested or organized by the group or department who would like to undergo the training.

Keywords: ICT Infrastructure, ICT Competency Level, ICT Integration

**iafor**

The International Academic Forum  
[www.iafor.org](http://www.iafor.org)

## **Introduction**

Technology is transforming how we live, work, play and think. Education needs to equip young people to thrive in tomorrow's work by laying its foundation in preparation for the industrial revolution. Education is needing new skills that may help faculty manage formidable tools that are to be used to technology and creatively design lesson that integrates technology in the classroom. In pursuit of technological and globalized education, SEAMEO (2018) averred that in the 21st century the world changes fundamentally by the rapid development of ICT and encourages people to invest in ICT and Media Literacy skills. faculty in pursuit of technological advancement to become competent, resilient, productive and globalized individuals.

However, Global investments in ICT have been initiated to improve the learning and teaching of the school. Despite all these investments on ICT infrastructure, equipment and professional development to improve education result revealed that there is only little evidence of ICT adoption and use in teaching and learning;

In General Santos City, Philippines higher education both the public and private universities and local colleges are addressing the challenge of enhancing the faculty's ICT skills and infrastructure to become adaptive to technological change. The study aims to answer (1) the existing status of the Information Communication Technology (ICT) infrastructure; (2) the ICT competency level of the faculty and (3) the deterring factors that hinders the effectiveness of integrating of ICT in the classrooms in selected Higher Education Institution in General Santos City. The study adopted a mixed method of research specifically both the quantitative and qualitative approach to evaluate the status of ICT infrastructure and ICT Competency Level of faculty in Higher Education Institutions last February 2017 to October 2017, The study selected leading local public and private universities and a college in General Santos City, Philippines with a total of ninety-nine (99) randomly selected faculty. It employs a survey questionnaire, in-depth interview and focuses group discussion. The data were collected, analyzed and interpreted using descriptive statistics and thematic analysis for qualitative.

### **Existing status of ICT Infrastructure of selected higher education institutions.**

The tertiary schools have an average of 4 computer laboratories with an average of 207 desktop computer units (48 computer units per laboratory). It has an average of 3 laptop units solely used for ICT integration in the classroom, Schools has slow internet bandwidth with 30 Mbps-100mbps only. Both the private university and college have an adequate number of peripherals, equipment and multimedia devices used in the classroom as compared with the public university particularly those equipment used for editing tools. During the interview, it was mentioned that public universities don't have enough funds to supplement the necessary equipment and facilities for an ideal ICT classroom. Holler V., Harvey, S & Magnotta, M. (2006) averred that electronic technology like internet, audio, video, bulletin boards, webcasts, online learning web-based learning, and computer-based.

Most of the operating, utility and program package software used Microsoft applications and open-source software like Linux. It was observed that both public and private universities have no enough authoring tools installed on the computer. For

utility software, all of the laboratories were equipped with antivirus, backup files, firewalls, compression, and data recovery. For package programs, Microsoft package applications and open-source software were installed MSWord, MSEXcel, MS Powerpoint, MSPublisher. This was followed by tools like Photoshop, Microsoft Access, Dreamweaver and uses Java, PHP, SQL and Visual Basic for programming. However, it was revealed that all schools don't have authoring tools installed in the classroom. Lynch (1998) mentioned that technology infrastructure intensifies the use of skills in word processing, spreadsheets, basic computer and internet operations and knowledge of programming language. This was supported by Cennamo, Ross, and Ertmer (2010) purports that learning skills require ICT competencies and proficiency to handle educational software. They also suggested that schools should provide a continuous professional development program and supports the mechanism necessary in enhancing the 21st-century learning skills of both the faculty and students. Likewise Williams (2003) described ICT integration as a means of using tools like internet, e-learning technologies, CD ROMs and etc to assist the teaching and learning.

### **ICT Competency Level of the Faculty in Selected Higher Education Institutions**

The goal of technology is not only to prepare the learners into the workforce of using new technologies but to improve the social development and economic productivity of individuals (UNESCO,2008). The National ICT Competency Standards (NICS, 2005,2004) describe technological competency in three components, computer literacy skills, information literacy and utilization of ICT classroom integration strategies. ACRL (2000) underscored that computer literacy focused with the rote learning of specific hardware and software applications.

Basic Computer Literacy Skills (n=99)	Public University (n=44)		Private University (n=32)		Private College (n=23)		Overall Competency of Tertiary School Faculty	
	Mean	Rem	Mean	Rem	Mean	Rem	Mean	Rem
<b>Basic Computer Operations</b>	3.48	<b>HC</b>	3.63	<b>HC</b>	3.85	<b>HC</b>	3.65	<b>HC</b>
File Management	3.27	LC	3.27	MC	3.88	VHC	3.47	MC
<b>Word processing</b>	3.19	<b>MC</b>	3.39	<b>HC</b>	3.28	<b>HC</b>	3.94	<b>HC</b>
<b>Spreadsheets</b>	3.16	<b>HC</b>	3.34	MC	3.77	<b>MC</b>	3.42	MC
<b>Video editor tools or film production</b>	3.17	<b>LC</b>	3.36	MC	3.72	<b>HC</b>	3.42	MC
<b>Slide presentation</b>	<b>3.65</b>	<b>HC</b>	<b>3.71</b>	<b>HC</b>	<b>3.88</b>	<b>HC</b>	<b>3.74</b>	<b>HC</b>
Photo editing	3.57	MC	3.36	MC	3.76	HC	3.56	MC
Electronic mailing	3.86	LSC	3.95	HC	3.85	HC	3.89	MC
<b>Multimedia editing</b>	<b>2.28</b>	<b>LC</b>	<b>2.51</b>	<b>MC</b>	<b>3.18</b>	<b>MC</b>	<b>2.66</b>	<b>MC</b>
<b>Blogging</b>	<b>2.50</b>	<b>LC</b>	<b>2.60</b>	<b>LC</b>	<b>3.08</b>	<b>MC</b>	<b>2.73</b>	<b>MC</b>
<b>Social networking</b>	<b>2.21</b>	<b>LC</b>	<b>3.08</b>	<b>MC</b>	<b>3.64</b>	<b>HC</b>	<b>3.28</b>	<b>MC</b>
<b>Over all Mean</b>	3.12	MC	3.35	<b>MC</b>	3.77	<b>HC</b>	3.28	MC

Legend:

1.00-1.80 Least Competent (LsC) 1.81-2.60 Less Competent (LC) 2.61-3.40 Moderately Competent (MC) 3.41-4.20. Highly Competent (HC) 4.21-5.00 Very Highly Competent (EC)

Table 1. Level of Basic Computer Literacy of the HEIs faculty

Table 1 showed that the **Basic Computer Literacy** skills indicated an overall mean of 3.29 rated as “**moderate**” was found to be the level of competence of faculty of higher education institutions of both the public and private universities and private colleges in General Santos City. The result further shows that faculty were **highly competent** in word processing ( $x=3.94$ ) particularly on entering, editing, copying, moving and inserting charts, links, illustrations, symbols, equations, and special texts. They are also **highly competent** in a slide presentation ( $x=3.74$ ) on developing slides presentation, application of slide layouts, printing using specialized page orientations and handouts. In addition, a mean of 3.65 indicates the faculty is **highly competent** in basic computer operations when setting up and connecting peripheral devices like printers, CD-ROM, external drives, modem, scanner, camera, and others. Also, a mean of 2.66 for multimedia editing, 2.73 blogging and 3.28 for social networking

rates as less to moderately competent was shown in the table. This implied that the faculty in HEIs are less likely utilized in the classroom due to less access to computer laboratories and internet connections. Davis and McGrail (2009) explained that blogging increases a person's desire to communicate and participate in discussions that may foster interactions with others. Blogs also increase the level of technological literacies.

**Information Literacy Skills** referred to a set of abilities the requires individual to recognize when and how information was utilized, the capacity to local and evaluate and how information was used effectively (ACRL,2000).

	Public Univ		Private Univ		Private College		OVERALL		
	Mean	Rem	Mean	Rem			Mean	Rem	
<b>Using blended learning, web 2.0, google aps and computer-based technologies inside my classroom learning activities</b>	<b>2.48</b>	<b>LC</b>	<b>3.00</b>	<b>MC</b>	<b>3.35</b>	<b>MC</b>	<b>2.94</b>	<b>MC</b>	<b>15</b>
<b>Using basic functional editor tools for photo, audio and video to generate projects and activities to be used in the classroom</b>	<b>2.95</b>	<b>MC</b>	<b>2.88</b>	<b>MC</b>	<b>3.83</b>	<b>HC</b>	<b>3.22</b>	<b>MC</b>	<b>4</b>
<b>Operating various open-ended software package editors for visualization, data analysis, simulations and lesson references</b>	<b>2.70</b>	<b>MC</b>	<b>2.94</b>	<b>MC</b>	<b>3.65</b>	<b>HC</b>	<b>3.10</b>	<b>MC</b>	<b>11</b>
<b>Applying authoring tools to design instructional resource materials in different media format</b>	<b>2.52</b>	<b>LC</b>	<b>2.81</b>	<b>MC</b>	<b>3.70</b>	<b>HC</b>	<b>3.01</b>	<b>MC</b>	<b>13</b>
<b>Using appropriate software/s to manage, monitor and assess progress of various student projects.</b>	<b>2.70</b>	<b>MC</b>	<b>2.78</b>	<b>MC</b>	<b>3.52</b>	<b>HC</b>	<b>3.00</b>	<b>MC</b>	<b>14</b>
<b>Using network to support students collaboration within and beyond the classroom</b>	<b>2.98</b>	<b>MC</b>	<b>3.09</b>	<b>MC</b>	<b>3.83</b>	<b>HC</b>	<b>3.30</b>	<b>MC</b>	<b>1</b>

Using virtual environments and knowledge building environment in the teaching-learning activities	2.73	MC	3.03	MC	3.52	HC	3.09	MC	12
Conceptualizing own learning materials and activities using online resource materials and websites	3.05	MC	3.00	MC	3.78	HC	3.28	MC	2
Developing knowledge and performance- based rubrics and apply them to assess students' understanding of key subject matter	3.00	MC	3.00	MC	3.65	HC	3.22	MC	4
Using ICT support and online instructional resource materials in increasing knowledge and understanding of subject matter	2.93	MC	3.06	MC	3.65	HC	3.22	MC	4
Over all Mean	2.80	MC	2.97	MC	3.65	HC	3.14	MC	

Legend:

1.00-1.80 Least Competent (LsC) 1.81-2.60 Less Competent (LC) 2.61-3.40 Moderately Competent (MC) 3.41-4.20. Highly Competent (HC) 4.21-5.00 Very Highly Competent (EC)

Table 2. Information Literacy Levels of Faculty in Higher Education Institutions in General Santos City

Data revealed that all public and private universities and colleges in General Santos City were **highly competent** in finding information needed for class papers, activities or projects on the internet as reflected by its mean of 4.10. Also, **Highly competent** in using and selecting specific search engines like google and yahoo in searching for data on information ( $x=4.02$ ).

Lavery and Reed (2006) underscored that faculty must be information literate to guide their knowledge in creating activities for the future development of their students. Whitworth & Person (2003) highlighted that the internet is a tool that enhances the capability of individuals that promotes collective learning and intelligence, exploration, encourages teamwork, creativity, and constructivism. Through technology, the teacher can access multiple online resources and multimedia learning activities. On the contrary, the result also showed that faculty was rated to be moderately to highly competent in constructing and implementing effectively-effectively-designed search strategies in Boolean operators, transaction and proximity

for search engines (x=3.24); preventing unauthorised internet access (x=3.41); and participating in professional communities like sharing and discussing best teaching practices.

Harris (2001) said faculty should telecollaborative with students through the internet to allow them to be exposed with differing opinions, views, beliefs, compare, contrast, combine and provide platforms for communication with the real audience using text and imagery. ACRL (2000) purported that information literacy can multiply students self-directed learning as they become engaged in wide variety of information sources to expand their knowledge, ask informed questions and develop their critical thinking skills. Through this approach faculty will be guided in settling problem-based approaches at a deeper level by allowing the students to often use thinking skills and become self-paced learner.

**ICT Classroom Integration** was describe as an effective teaching strategy that promotes collaboration, transforms faculty roles, directs independent learning and promote knowledge-based building communities (Biemans,1996)

	Public Univ		Private Univ		Private College		OVERALL		
	Mean	Rem	Mean	Rem			Mean	Rem	
<b>Using blended learning, web 2.0, google aps and computer-based technologies inside my classroom learning activities</b>	<b>2.48</b>	<b>LC</b>	<b>3.00</b>	<b>MC</b>	<b>3.35</b>	<b>MC</b>	<b>2.94</b>	<b>MC</b>	<b>15</b>
<b>Applying authoring tools to design instructional resource materials in different media format</b>	<b>2.52</b>	<b>LC</b>	<b>2.81</b>	<b>MC</b>	<b>3.70</b>	<b>HC</b>	<b>3.01</b>	<b>MC</b>	<b>13</b>
<b>Using appropriate software/s to manage, monitor and assess progress of various student projects.</b>	<b>2.70</b>	<b>MC</b>	<b>2.78</b>	<b>MC</b>	<b>3.52</b>	<b>HC</b>	<b>3.00</b>	<b>MC</b>	<b>14</b>
<b>Using network to support students collaboration within and beyond the classroom</b>	<b>2.98</b>	<b>MC</b>	<b>3.09</b>	<b>MC</b>	<b>3.83</b>	<b>HC</b>	<b>3.30</b>	<b>MC</b>	<b>1</b>
<b>Conceptualizing own learning materials and activities using online resource materials and websites</b>	<b>3.05</b>	<b>MC</b>	<b>3.00</b>	<b>MC</b>	<b>3.78</b>	<b>HC</b>	<b>3.28</b>	<b>MC</b>	<b>2</b>
Over all Mean	2.80	MC	2.97	MC	3.65	HC	3.14	MC	

Legend: 1.00-1.80 Least Competent (LsC) 1.81-2.60 Less Competent (LC) 2.61-3.40 Moderately Competent (MC) 3.41-4.20. Highly Competent (HC) 4.21-5.00 Very Highly Competent (EC)

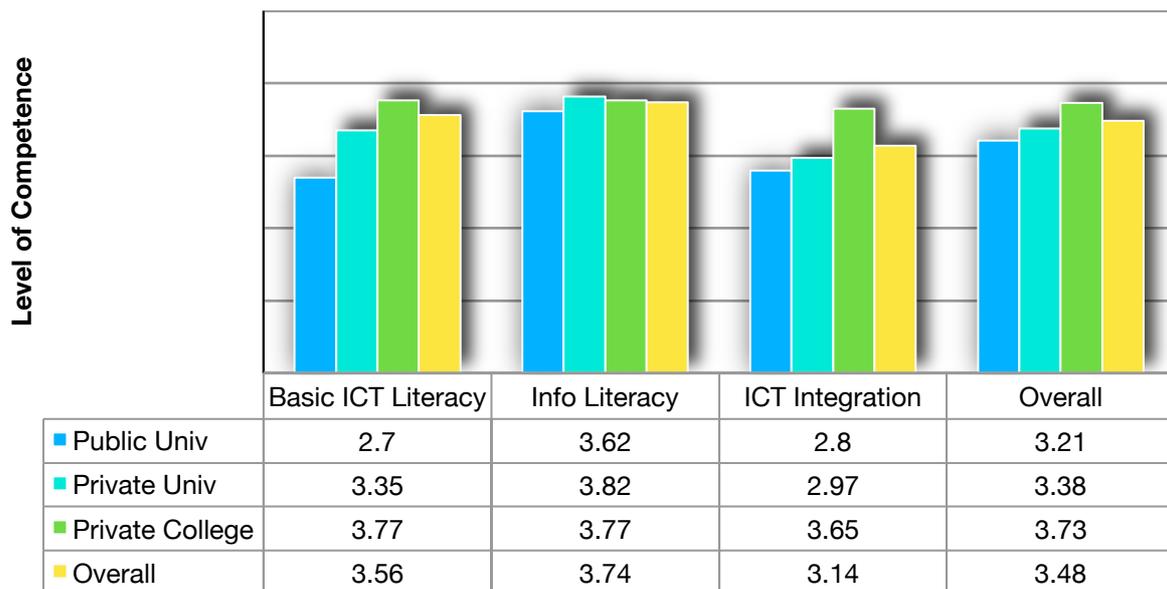
Table 3. Level of ICT Classroom Integration of Faculty in Higher Education Institutions in General Santos City

The study revealed that faculty of the private and public universities and college of General Santos City rated as **moderately competent** in using networks to support student collaboration within and beyond the classroom (3.30). Further, conceptualizing own learning materials and activities using online resource materials and websites ( $x=3.28$ ). UNESCO (2003) explained that the use of ICT in the classroom is a mechanism that promotes rethinking and transforming the educational systems and processes in producing quality education to all. Guitert et.al. (2003) proven that ICT was an excellent tool to help students and faculty organize themselves and develop collaborative learning in a virtually-designed environment. This was supported by Saavedra and Opfer (2012) that the internet is a learning tool that facilities personal contour and access to content and services that are most helpful

to students and faculty. However, a mean of 2.94 respectively means that the faculty were rated from **less to moderately** in using blended learning, Web 2.0, google maps and computer-based technologies in the classroom learning activities. Moreover over a mean of 3.01 indicates a less to **moderately competent** in applying authoring tools to design instructional resource materials in different media projects and using appropriate software to manage, monitor and assess the progress of various student projects as reflected by its mean of 3.00. Furthermore, it was revealed that private colleges have 32% very highly competent faculty and 32 % competent faculty as compared with the public university with 5% Very high competency and 26% high competency. While Private university has 6. 1% very highly competent, 21% highly competent. This implies that private universities higher percentages in integrating ICT in the classroom as compared with other universities.

Commission of European Communities (2001) said that the need to facilitate access to resources, services, remote exchange, and collaboration to improve quality learning. They emphasize that universities should now have intranet websites as basis for ICT used. They reported that in 2005 individual modules are offered online with a shift to more collaborative, problem-based and project-based learning methods.

In order to strengthen traditional practices, Cuban et.al (2001) purported that faculty should learn to innovate by taking what technology can offer.



Legend:

1.00-1.80 Least Competent (LsC) 1.81-2.60 Less Competent (LC) 2.61-3.40 Moderately Competent (MC) 3.41-4.20 Highly Competent (HC) 4.21-5.00 Very Highly Competent (EC)

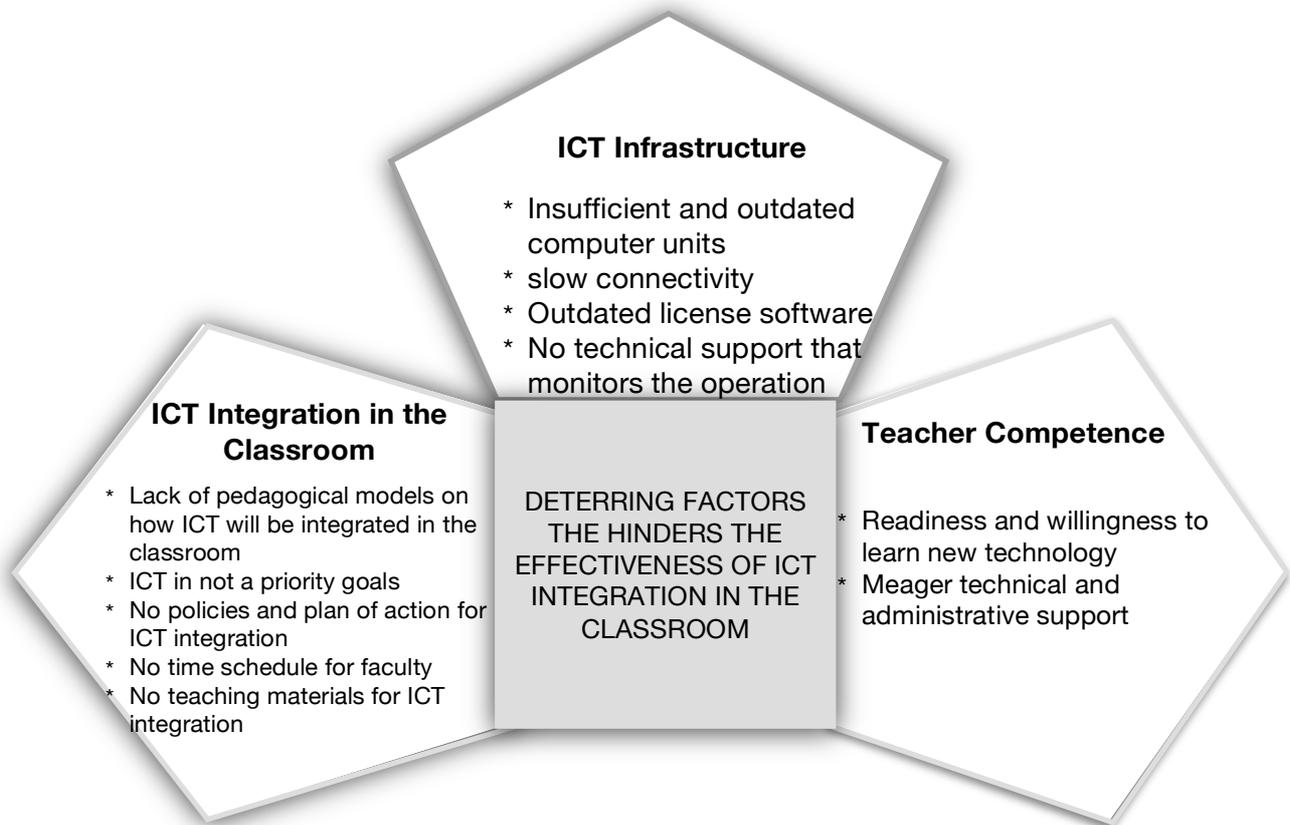
Figure 1. Summary of ICT Competency Skills of the faculty of the Higher Education Institutions.

Figure 1 showed the summary of faculty competency skills of the faculty of the Higher Education Institutions. The findings showed a mean of 3.77 was reflected for private college rated as highly competent. While both the private university ( $\bar{x}=3.36$ ) and public university ( $\bar{x}=2.70$ ) were rated moderately competent. This implied that

private college has higher competency rate as compared to both public and private university. When the nature of computer literacy is examined, it is essential to improve the literacy levels not by age but individuals knowledge and skills level.

Figure 2 below presents the deterring factors on the effectiveness of ICT integration in the classroom. During the in-depth interview, there were three thematic terms that evolve in the study. These are ICT infrastructure, Teacher competencies and ICT integration in the classroom.

**ICT Infrastructure.** Informants stated that insufficient numbers and outdated computer units are one of the major problems in the integration of ICT in the classroom. The computer units used solely for courses related to ICT but not for classroom integration. Added to the problem is the slow internet connectivity or bandwidth ranging from a speed of 30mbps-50 Mbps only. Lastly, some of the computer units have expired or outdated license software.



**Figure 2. Thematic Analysis on the deterring factors the hinders the effectiveness of ICT Integration in the classroom in selected HEIs in General Santos City**

ICT Infrastructure. Insufficient and outdated computer units are one of the major factors that hinder the effectiveness of ICT integration. Plomp et al. (2009) underscored that ICT infrastructure and resources are a necessary condition for the integration of ICT in education. Afshari et.al (2009) said that inadequate access to a computer in the classroom was not a barrier to ICT but it improved availability and fairness of access to technology resources of teachers, students, and administrative

staff. The result of the interview and observation revealed that there were insufficient and outdated computer units, slow connection and outdated license software. Jones (2004) supported the result and emphasized that breakdown of computer causes interruptions and if there is a lack of technical assistance that will do regular repairs this may further lead to a cyber phobia. NCTE in 2005 found that about 85.3% of the schools reported technical support and maintenance as high or very high.

Faculty said that support by school officials influences faculty to apply ICT in the classroom without wasting time to troubleshoot the hardware and software problems.

Teacher competencies. Computer competency is defined as being able to handle varying applications for various purposes (Van Braak et al, 2004). Evidence suggests that the majority of teachers who reported negative or neutral attitudes towards the integration of ICT into teaching and learning processes lacked knowledge and skills that would allow them to make “informed decisions” (AlOteawi, 2002, p.253, as cited in Bordbar, 2010). Information revealed those faculties are not motivated to use ICT in the classroom. Faculty do not have peer support, coaching and mentoring and problems on adaptability to technological transformation. Most of the informants mentioned that prevalent barriers that hinder the successful integration of ICT were meager technical or organizational support, teacher attitudes and expertise, and technology itself (Moeller & Reitzes (2011). Furthermore, ICT integration and information literacy training requested or organized by groups or departments who would like to undergo training were subjected to the availability of funds and approval of the head of the agency. The survey underscored that only 8% of the faculty can integrate fully technology in the classroom and 43% of pupils felt unprepared to utilized technology as they approached higher levels of learning. They argued that technology supports student-centered learning practices using flexible scheduling, pacing, project-based learning, community involvement, and assessment. It was suggested that to address this program HEIs should provide continuing ICT capability programs on basic ICT literacy, Cennamo, K, Ross and Ertmer (2010) said that to become competitive one should develop their ICT competencies and proficiency to handle educational software. Lowe(2000) underscored that the ICT program should recognize the ability to influence individual participation on varying levels and experiences.

ICT Integration in the Classroom. Most of the faculty informants said that they do not have pedagogical knowledge on how ICT will be integrated into the lesson. This is inconsonant to the statement of Peralta and Costa (2007) found that technical competence influences teachers ' used of ICT in teaching. Further, they mentioned most of the experience and new teachers express the need for technical skills, technical competence, pedagogical efficiency, and attitude. Those faculty who have more experience with the computer had greater confidence and have the ability to use them effectively. The study of Russell et.a. (2003) disclosed that new teachers who were highly skilled with technology more than older did not incorporate ICT in teaching. According to the new teachers' experiences challenges in their first few years in teaching then they tried to spend their time familiarizing themselves with the school's curriculum and classroom management. They added that they did not find any relationship between teachers teaching experience and the use of ICT implying teachers ICT skills and successful implementation of complex and vague predictor of ICT integration, Lastly, ICT integration in the classroom is not a priority goal of the

institution and there is not scheduled time given to faculty to meet, share, evaluate or develop instructional materials.

## **Conclusion**

As a result of the study, revealed that the status of ICT infrastructure of Higher Education Institutions (HEIs) either in public and private universities and college was not that adequate and functional. Most of the school has a 1:4 ratio which means that there is an average of 4 computer laboratories per school. Each school has an average of 207 installed computer units with an average of 48 computer units per laboratory with adequate basic peripheral units like the mouse, monitor, and keyboard. There were only at most 3 laptop computers used when integrating ICT in the classroom. Common software installed is free packaged software like Microsoft accompanied by the Windows Operating system and other units operated by the Linux system has an open-source software.

Consequently, teacher's ICT competency level is a significant concept to address the technological uncertainties faced by higher education institutions both the public and private universities and college. HEIs were found to be moderately to highly competent in basic computer literacy specifically in slide presentations, basic operations, and word processing. While private college is highly competent in information literacy particularly in finding information on the internet. While in ICT integration in the classroom it was rated moderately competent in supporting students with collaboration and conceptualization or materials and activities using online resources or websites.

Most of the problems encountered by the faculty were insufficient number and outdated computers, lack of multi-media equipment, lack of pedagogical knowledge on integrating ICT in the classroom. Some of the HEIs believed that ICT is not a priority goal of the university. There is also no regular schedule for faculty to use the laboratory for future integration, evaluation or assessment and develop instructional materials. To improve this, public and private universities should add new computers with installed license software for basic operations as well as authoring tools in order to successfully integrate ICT in the classroom. There should also be provisions of continuing ICT capacity programs that may faculty skills on blogging, social media networking, web 2.0. blended learning, flip classrooms, google learning and other technological tools. Creation of ICT committee that will spearhead the operationalization, establishment of policies, guidelines, monitoring, evaluation and sustainability plans.

## References

- Afshari, M., Bakar, K.A., Luan, W.S., Samah, B.A., & Fooi, F. S.(2009). Factors affecting teachers' use of Information and Communication Technology. *International Journal of Instruction*, vol. 2, no. 1, pp.78-98
- American Library Association. Presidential Committee on Information Literacy. Final Report. (Chicago: American Library Association, 1989.)  
<http://www.ala.org/acrl/publications/whitepapers/presidential>.
- Association of College and Research Libraries (2000). Information Literacy Competency Standards for Higher Education. American Library Association  
<http://www.ala.org/acrl/standards/informationliteracycompetency>.
- Minnesota government. (2015). Competencies for Information and Communication Technology (ICT) Literacy. Retrieved at <http://mn.gov/mnddc/asd-employment/6a-ict-competencies.html> on December 11, 2015.
- Cennamo, Katherine, Ross, John D. (John Douglas), Ertmer, Peggy A,(2010) International Society for Technology in Education. Wadsworth, Cengage Learning,
- Commission of the European Communities (2008). The use of ICT to support Innovation and lifelong learning for all-A report on progress.
- Cuban, L. (2001). *Oversold and Underused: Reforming Schools Through Technology, 1980- 2000*. Cambridge MA: Harvard University Press.
- Curriculum Standards for K to 12 Schools in the Philippines. Retrieved at AL Bonifacio - [linc.mit.edu](http://linc.mit.edu) on October 29, 2015.
- Davis, A. P., & McGrail, E. (2009). The joy of blogging. *Educational Leadership*, March 2009, 74-77.
- Cennamo, K., Ross, J. & Ertmer, P. (2010). *Technology Integration for Meaningful Classroom Use*. Wadsworth Cengage Learning. USA.
- Guitert M. Giménez F. Lloret T. El procés de treball i d'aprenentatge en equip en un entorn virtual a partir de l'anàlisi d'experiències de la UOC 2003 Documents de projecte DO03-001. IN3-UOC.<http://www.uoc.edu/in3/dt/20299/index.html>
- Koller, V., Harvey, S & Magnotta, M. (2006). *Teaching Based Learning Strategies*. Social Policy Research Associates. Retrieved at [www.doleta.gov/reports/papers/tbl\\_paper\\_final.pdf](http://www.doleta.gov/reports/papers/tbl_paper_final.pdf) on November 5, 2015.
- Lowe, G. (2000). *Adult Literacy and Life skills Survey: Information Communication technology Literacy Assessment framework*. Canadian Policy research Networks and University of Alberta.
- Lynch, Clifford (1998). The evolving internet: Applications and network service infrastructure. *Journal of the American Society for Information Science*. Vol 49. Issue 11. [https://doi.org/10.1002/\(SICI\)1097-4571\(1998\)49:11<961::AID-ASI2>3.0.CO;2-%23](https://doi.org/10.1002/(SICI)1097-4571(1998)49:11<961::AID-ASI2>3.0.CO;2-%23)
- Moeller, Babette. & Reitzes, Tim (2011). *Integrating Technology with Student Centered Learning*. IssueLab retrieved from

<https://www.issuelab.org/resource/integrating-technology-with-student-centered-learning.html>

Peralta, H., Costa, F.A. (2007). Teachers' competence and confidence regarding the use of ICT. *Educational Sciences Journal*, vol. 3, pp. 75-84

Plomp, T., Anderson, R. E., Law, N., & Quale, A. (Eds.). (2009). *Cross-national information and communication technology: policies and practices in education*. Charlotte, N.C.: Information Age Publishing.

Saavedra, A. & Opfer, V. (2012). *Teaching and Learning 21st century skills: Lessons from the Learning sciences*. Retrieved at AR Saavedra, VD Opfer - 2012 - rand.org on March 1, 2015.

UNESCO (2003). *Communiqué of the ministerial roundtable on 'Towards Knowledge Societies'*. Paris

UNESCO (2008). *ICT Competency Standards for Teachers*. Retrieved at [unesdoc.unesco.org/images/0015/001562/156207e.pdf](http://unesdoc.unesco.org/images/0015/001562/156207e.pdf) on December 11, 2015.

Williams, M. D. (2003). *Technology integration in education*. In Tan, S.C. & Wong, F.L. (Eds.), *Teaching and Learning with Technology*, pp. 17-31: An Asia-pacific perspective. Singapore: Prentice Hall.