

Leading the 21st Century ICT-Based School in the Changing Paradigm in Education: Challenges and Steps Forward

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ABSTRACT

This mixed-method research proposes a model-framework for integrating Information and Communication Technology (ICT) in the school. Data were generated from the relatable knowledge and experiences of participants-school heads and teachers, and the valuable sharing of leaders in selected Teacher Education Institutions (TEIs).

The quantitative findings illustrated that school heads were having difficulty in the implementation of ICT in their schools despite having been assessed as highly knowledgeable, excellent in ICT skills and having highly positive attitude as regards ICT per se. This inconsistency poses constraints and challenges for the optimal implementation of ICT in the school even if the teachers also viewed the actual ICT implementation in curriculum and instruction as operating very well in agreement with that of their school heads' perceptions. Meanwhile, the three participant-leaders of the selected (TEIs) explicitly described the different ICT platforms they employ to gear up the potentials of pre-service teachers on ICT-based teaching in the light of 21st century education. The triangulation of findings highlights the significance of leadership in integrating ICT in schools through the proposed model-framework that underscores a learner-centered curriculum, faculty retooling, and personnel collaboration to maximize human potentials.

Keywords

ICT leadership, 21st century education, mixed-method research, ICT integration model-framework

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Introduction

“We need to prepare students for THEIR future not OUR past”

-Ian Jukes (2006)

The industrial revolution from the 19th century to the 21st century has brought extreme competition, undeniable risks and varied systems of work, thus, obliging each country to be aggressive and competitive at every aspect of development. Ajitabh and Momaya (2003) agreed that the global needs of the 21st century has created a big room for the nation to think out of the ordinary in meeting them. Those who take risks and are most innovative become the market leaders. According to The World Economic Forum, competitiveness is defined as established set of institutions, policies, and aspects that outlines the level of productivity of a country. The International Institute for Management Development defines competitiveness as “a field of economic knowledge which analyzes the facts and policies that shaped the ability of a nation to create and maintain an environment that sustains more value creation for its enterprises and more prosperity for its people.” Therefore, countries do their best to be globally competitive to help sustain the good economic health and affluence to its citizens.

The World Economic Forum annually publishes the economic status of the different countries around the world through the Global Competitiveness Report. It bases its competitiveness analysis on the Global Competitiveness Index or GCI, a comprehensive tool that measures the microeconomics and macroeconomics foundation of national competitiveness. The GCI is composed of 12 Pillars of Competitiveness: (1) institution; (2) infrastructure; (3) macroeconomic environment; (4) health and primary education; (5) higher education and training; (6) labor market and efficiency; (7) goods market efficiency; (8) financial market development; (9) technological readiness; (10) market size; (11) business sophistication and (12) innovation (Global Competitiveness Report 2015-2016). In the GCI 2015-2016, the following countries ranked the highest: (1) Switzerland, (2) Singapore, (3) United States, (4) Germany, (5) Netherlands, (6) Japan, (7) Hong Kong SAR, (8) Finland, (9) Sweden, (10) United Kingdom, (11) Norway, (12) Denmark, (13) Canada, (14) Qatar and (15) Taiwan, China. These countries are also the top 15 out of 144 countries in 2014-2015. Fourteen (14) of the listed countries belong to the advanced economies whereas Qatar belongs to the group of

Middle East, North Africa and Pakistan (Global Competitiveness Report 2015-2016).

In Asia, Singapore, Japan, Hong Kong SAR and Republic of Korea are categorized in the advanced economy according to the GCI 2015-2016. Singapore ranked first in the basic requirements sub index while Hong Kong ranked 3. This means that Singapore and Hong Kong have good inter-agency relationship among the government institutions and private sectors to ensure the breed of good income for the country and the workforce has been provided with good health support and basic education to institute a good investment for the efficiency of each citizen. Evidently, the government of Japan and Singapore helped the local workers to sustain their employment by undergoing training modules to enhance their skills and encourage larger workplace diversity (Economist Intelligence Unit, 2012 & Southeast Asian Economic Outlook, 2013).

On efficiency enhancers sub index, Singapore, Hong Kong and Japan were included among the top ten countries. These countries have proven their competence in the pillars of higher education and training; goods market efficiency; labor market efficiency; financial market development; technological readiness; and market size. The technological readiness of Hong Kong is manifested by its success in targeting the international market while maintaining the quality of work done (Beyond Asia, 2012). Out of these Asian countries, Japan ranked second in the innovation driven economies. This demonstrates that Japan has a high level system of business for having better efficacy in the production of goods and services and advanced standard of living through technological revolution.

Ozturk (2001) mentioned that education is the primary key to achieve sustainable economic development and it is a way to improve human capital. This is reflected in the 12 Pillars of Competitiveness of the GCI. Some of the pillars are health and primary education, higher education and training, technological readiness and technological innovation.

The fourth pillar is Health and Primary Education. According to the World Economic Forum (2013), basic education increases the efficiency of each individual worker. However, workers who have received little or no formal education can carry

out only simple manual tasks and find it much more difficult to adapt to advanced production processes and techniques. In other words, lack of basic education can become a constraint on business development because firms find it difficult to move up the value chain by producing more sophisticated or value-intensive products with the existing human resources. The lack of skills can be augmented up by the fifth pillar which concerns higher education and training. The fifth pillar reinforces education by producing skilled and well-educated citizens who can accomplish more challenging tasks. This includes vocational and on-the-job training which can contribute eloquently in the working force of the country (Global Competitiveness Report 2014). In line with these, McIntosh and Vignoles (2001) acknowledged the importance of the basic literacy and numeracy skills of the workers in the workforce while Psacharopoulos (1988) cited that education is an investment in the economic growth of the country. The success of the world market can be attributed to the quality of education, quality of teaching force and reinforced instruction in the higher level.

The ninth pillar is technological readiness. It explains that the readiness of the countries in information and communication technologies (ICT) can boost the efficiency of the economy. The more ICT access a country has, means better technological readiness which can lead to the emergence of new technology. This gives way to the eleventh pillar which is on technological innovation. Technological innovation transforms the current trends and broadens the possibilities of existing processes in the world industry (Global Competitiveness Report 2014).

The Philippines ranked 47th from 52nd in the 2014 and 2015 report. The country belongs to the emerging and developing countries in Asia, making the transition in the economy from factor driven to being efficiency driven (Global Competitiveness Report 2015-2016). The Philippines' ranking in the global competitiveness report is summarized on the tables below.

Table 1 shows that the Philippines continuously improves its rank in the overall GCI ranking.

Table 1: 2012 – 2016 GCI Ranking of the Philippines

Year	No. of Countries	CGI Overall Ranking	Sub Index Ranking		
			Basic Requirements	Efficiency Enhancer	Innovation & Sophistication Factors
2015-2016	140	47	66	58	48
2014-2015	144	52	66	51	47
2013-2014	148	59	78	58	58
2012-2013	144	65	80	61	64

(Global Competitiveness Index 2012 – 2016)

Though this improvement made the Philippines stagnant at being in the transition from Stage 1 to Stage 2 economies for the past five years. In the sub index ranking, the basic requirements increased its rank from 80th to the 66th in the past four years. However, there was a setback on the performance of the Philippines in the efficiency enhancers, and innovation and sophistication factors. The efficiency enhancers went down to 58th from being 51st from the previous year while the sophistication factors went down one rank to 48th. This means that even though there is a

constant increase in the Philippines overall ranking, there are still some setbacks in the country's sub index ranking. Because of this, the Philippines' ranking in the basic requirements is in the lower half of the 140 countries which is one of the possible reasons why the Philippines has difficulty in going to the efficiency driven economies.

Table 2 shows that on the four pillars that concern the Department of Education have a consistent increase in the ranking.

Table 2: 2012 - 2016 Ranking of the Philippines in Health and Primary Education, Higher Education and Training, Technological Readiness, and Innovation

Year	Number of Countries	Health & Primary Education	Higher Education & Training	Technological Readiness	Innovation
2015-2016	140	86	63	68	48
2014-2015	144	92	64	69	52
2013-2014	148	96	67	77	69
2012-2013	144	98	64	79	94

Except in health and primary education, higher education and training, and technological readiness still put the country in the lower half of the 140 countries in the ranking. On the other hand, there was a leap of 46 notches in the innovation for the past five years of the report.

Table 3 presents the detailed status of the Philippines in primary, secondary and tertiary education enrolment, availability of latest technology, and its capacity for innovation.

Table 3: 2012 - 2016 Global Competitiveness Ranking of the Philippines in Primary Education Enrolment, Secondary Education Enrolment, Tertiary Education Enrolment, Availability of Latest Technology and Capacity for Innovation

Year	Number of Countries	Primary Education Enrolment (net)	Secondary Education Enrolment (gross)	Tertiary Education Enrolment (gross)	Availability of Latest Technology	Capacity for Innovation
2015-2016	140	100	86	81	78	33
2014-2015	144	105	89	82	58	30
2013-2014	148	108	83	81	47	48
2012-2013	144	101	81	76	56	86

The enrolment in the primary education is always on the third quartile leading to low enrolment in

the secondary and tertiary education. The capacity for innovation of the country is high but the

availability of the latest technology is on the third quartile rank. This suggests that the Philippines has the ability to innovate but due to low enrolment from primary to tertiary education and unavailability of the latest technology, not many Filipinos have the chance to be educated and therefore they cannot improve the standard of living in the Philippines. Thus, making the Philippines difficult to become an efficiency driven economy. The elevation of the Philippines to an efficiency driven economy can be achieved by improving the education of the country. To constitute change in education means to have educational reforms in the country. The digital age obligated the Department of Education to find new ways of teaching and learning and gave way to the revision of the basic education curriculum that is the K to 12 Basic Education Program. According to the Department of Education (DepEd), the 12-year basic education meets the global standard and prepares each student in his/her life and career skills; learning and innovation skills; and information, media and technology skills. Jerald (2009) supported this by emphasizing that the educational institutions should ensure the availability of the 21st century skills to adapt in the technological world. The Programme for International Student Assessment (PISA) added that at the present, it is more important that the students know how to perform tasks in diverse situations and enhance problem-solving ability rather than just obtaining content knowledge.

Developed and developing countries have adopted the use of ICT as their fundamental tool in empowering their education (Bonifacio, 2013; Ghavifekr, Afshari, Siraj & Seger, 2013; Mingaine, 2013; Polizzi, 2011; Ugwu & Oboegbulem, 2013). Kawade and Kulkarni (2012), articulated that ICT application in education is practical in the teaching and learning process and has created more opportunities in educating the young minds (Oliver, 2002). In addition, Ghavifekr (et.al, 2013) suggests that ICT applications can aid the administrative system and students' education.

The Malaysian Ministry of Education Articulation of ICT education aimed at developing an ICT literate society where ICT will be used as a tool in education and enhance efficiency, effectiveness

and productivity of management in education. (Multimedia Development Corporation, 2005)

Zamanet.al, (2011), have observed that many countries in Africa have started putting investment in using ICT in their schools. In 2005, Kenya had equipped their secondary schools with ICT facilities and incorporate the use of it in their classrooms. Adu and Olatundun (2013) emphasized that ICT can create easy access to education especially those with overpopulated countries. As mentioned by Amutabi and Oketch(2003), India's population can benefit in the mobility of education through ICT. Furthermore, McGorry (2002) reiterated that ICT eradicates the low percentage of illiterate education in any country.

Bonifacio (2013) cited that K-12 education in the Philippines has ICT curriculum standards that enable the program to integrate technology in the different subject areas across all levels. He suggested that integrating ICT should have standards in order to demonstrate mastery of skills on the part of the learners. This will also prepare Filipinos to meet the global standards in ICT.

In 2004, DepEd Secretary Florencio Abad verbalized that a country can be dominant with the availability of easy access to information and one that utilizes technology. Unfortunately, the Philippines is not eligible because our system of education cannot produce such. Hence, he started to bring ICT in schools by (1) bringing relevant curriculum to the learners; (2) capacitating teachers to teach and administer ICT's in education; (3) ensuring accessibility and availability of ICT equipment through stakeholders; and (4) having School-Based ICT in Education Program.

DepEd worked hand in hand with Intel, Microsoft and UNESCO to train the teachers to be fully equipped in using ICT in their classrooms in the projects Intel Teach for the Future Program, Partners in Learning (PIL) and SchoolNet Project.

In 2008, DepEd released the DepED ICT4E Strategic Plan (Five-Year Information and Communication Technology for Education Strategic Plan). This DepED ICT4E Strategic Plan wants to transform the primary education of the Philippines to produce students that are (1) dynamic life-long learners and values centered,

(2) productive, (3) and responsible citizens (DepEd 2008, and Draft DepED ICT4E Strategic Plan).

Related Leadership Theories

Leadership is an essential facet of an organization; good leadership can propel a great development in the entire operation of the organization. As (Basu, 2015) uttered, able leadership is critical for realizing change in an organization. While transformational and servant-leadership are two prominent leadership styles that work well in Information Technology, there is little consensus as to what constitutes effective leadership and none of the leadership theories seem to answer the leadership challenges correctly at this time (Latham, 2014). Research has shown that there is a positive relationship between transformational leadership and employees' commitment to the change and their leader (Basu, 2015). Perhaps the inability of researchers to pinpoint a universal answer is indicative that there is no universal answer to leadership (Latham, 2014). Both leadership theories are essential in utilizing necessary organizational change considering subordinates' inputs and welfare.

To facilitate the reforms in education, the school administrators are expected to oversee and manage such transformations. As stated in Republic Act No. 9155, Chapter 1 Section No. 7, Letter #, Paragraph 3, the school heads or the principals shall have the authority, responsibility and accountability in managing their respective schools. This gives them the responsibility to use information and communication technology in the school, thus, automatically oblige them to be technological leaders of the schools. Anderson and Dexter (2000) and Hughes et.al, (2005), emphasized that resilient leadership in school organizations is the foundation of a successful technology-based revolution. This era of 21st century, the Philippine educational system needs technological leadership.

Technological leadership focuses on the application of technology in effective teaching, better learning outcome and school administrative operation (cited in Anderson & Dexter, 2005; Chin, 2010; & Chang, 2011). Bonifacio (2013) explained that a technological leader must be trained in (1) vision, (2) planning, and (3) management. The school leaders must foresee

how the changes can be affected by technology, plan the programs for development and systematized procedures in implementing and evaluating their programs.

Oboegbulem and Uguw (2013) identified the role of ICT in the administration of secondary schools in Nigeria. The study emphasized that the school administrators should be updated in the principles and application of ICT to enhance teaching and learning. In addition, Edefioghho (2005) clarified that ICT increases the efficiency and effectiveness of educational management and administration. Through the use of ICT, the school managers can systematize processes and save time to focus on instructional leadership. Thus, the principals should have all the necessary information about their schools in a laptop and must maximize the use of ICT in managing a school.

Ang'ondi (2013) articulated that decent support from the school administrators to teachers in using ICT would lessen teachers' hesitation in using ICT in their classrooms. According to the technical support teachers (Champions), a great commitment from the school administration can bring out the willingness of teachers to integrate ICT in their daily classes. The fear of change from the experienced teachers would turn into learning experiences and teacher-improvement in their respective schools. It was then recommended by the author to provide intensive training for both teachers and administrators.

A cumulative number of scholars have studied the impact of using ICT by school administrators (Akbaba-Altun 2004; Flanagan & Jacobsen 2003; Fullan 2002; Hamzah et al, (2010). Polizzi (2011), recapitulated that ICT integration in the curriculum by the teachers can be effective with the support and leadership of their school principals. He further emphasized that, active leadership by the principals is pragmatic to keep up with the technological changes in the process of teaching and learning.

Tondeuret.al, (2008), classified the requirements on an active intervention by school principals into 5, (1) the presence of an ICT policy plan, (2) leadership supporting the process of ICT integration, (3) school internal support, (4) evaluation of ICT use; and (5) between-school cooperation. The results of their study suggested

that a collaborative approach can be used to share a school-wide vision of ICT integration.

Makhanu (2010) quantified that principals who are knowledgeable in ICT and its relevance in school leadership functions play a substantial role in improving school performance in the Western province of Kenya. The ICT literacy of the principals can influence the general performance of their school in terms of its organization, curriculum and management. The paper concluded that the level of ICT literacy of school leaders can lead to quality leadership that will then leads to quality schools.

Chang (2011) affirmed that principals' technological leadership improves technological literacy and particularly influences teachers to integrate technology in their teaching. In addition, school principals, as technological leaders, should develop and implement vision and technology plans for their schools, encourage the technological development and training for teachers, provide sufficient technological infrastructure support, and develop an effective school-evaluation plan. The competence of the principals in technological leadership and integration creates a technological learning environment. Thus, teaching effectiveness then will increase and directly improve students' academic achievement.

Chang and Wu (2008) Yen (2010), Fu (2009) and Lo (2009) investigated the current level of the principals' technological leadership and teachers' teaching effectiveness in their respective country. The results of their study indicated that the principals' technological leadership has a significant and positive effect on teachers' teaching success. According to Fu (2009), the most predictive factors for overall teachers' teaching effectiveness are vision; planning and management; and evaluation and research.

According to Freidus et.al, (2001), secondary school principals are change agents who should be ICT literate in order to manage technological changes in the field of education. Through the integration of ICT in school leadership, school principals can be transformational leaders who can improve teaching, learning and people management.

Makewa (2013) of Kenya summarizes the role of school principals in integrating ICT in school administration. According to this study, ICT-based information administration can anchor personnel administration, general administration, supervision of instructions, financial administration, and student administration. The use of ICT by the school principals means that they are aware of the benefits of the new technologies as school facilitators.

Fullan (2002) has coined school principals as "Culture Change Principal (CCP)". According to him school leaders should have a mix of an innovative mind and appropriate actions to lead the multifaceted change in technological change in education. The school leaders must have the commitment to improve the schools and be good at the process of the transforming instructional quality and student achievement.

As technological leaders, the school principals should serve as role models at using ICT. Afshariet.al (2012) emphasized that the school principals should be first who should have the primary skills in integrating ICT in their work. Then, the teachers can be encouraged to integrate ICT in facilitating learning in their classrooms (Singh & Muniandi, 2012).

Selwood (2004) highlighted that ICT applications in school administration is important at completing their job. Seger (2013) further underlined the role of financial support in the effectivity of ICT integration in an educational organization. In addition, data management through the use of ICT keeps accurate information about the school and therefore resulting to easy access of school data.

Makhanu and Kamper (2012) detected that the ability to handle technological change and positive actions of school principals are determinants in the successful implementation of ICT in schools. Laaria (2013) further perceived that technological leadership is the foundation in the implementation of technology in schools. The school leaders should prepare excellent programs and a complement workforce to make this happen. Kedah (2014) disclosed the need of the school principals to manage and align their schools with the digital transformation of education today though they are unfamiliar or have little training about it (Mhosen, Attara, Van, & Laar, 2000).

Kedah (2014) divided the potential roles of ICT into structural and instructional. Structural role of ICT simplifies the administrative tasks of school administrators while its instructional role supports the enhancement of teaching-learning process by providing a dynamic cooperative learning environment.

Makhanu (2010) stated the following as the role of the school principal as a change agent of the technological era: (1) process helper – who provides technical and interpersonal assistance and facilitates problem solving; (2) resource linker – who communicates information about resources; (3) resolution giver – who assists in the introduction of innovations in the curriculum or instructional process; (4) negotiator – who develops strategies or skills for facilitating a collaborative process; (5) nurturer – who provides encouragement, reinforcement of emotional support; and (6) teacher and learner – who transmits information and develops receiver skills. The different roles show that technological transformation requires the community to be involved in every aspect of the improvement of the school.

Gronow (2007) reiterated that the responsibility of the school principals is to guarantee the best interest of the learners with the effective integration of ICT infrastructure and professional staff training. In addition, the school leaders must accept the importance of ICT in engaging students in their everyday lessons and it leads reforms in education. Collarbone (2003) and Sergiovanni et.al (2003) further supported this by emphasizing that the school principal's ability to develop a learning community plays a vital role in successfully leading and developing change. Therefore, the principal should establish a community of risk takers, innovators, and flexible to change (Gurr, Drysdale & Mulfor, 2006).

With the technological revolution in education come hindrances in achieving the digital demands in education. Kedah (2014) categorized them into four: (1) lack of informed leadership; (2) pedagogical issues; (3) inadequate professional development; and (4) concerns about equity. Mingaine (2013), listed the challenges encountered during implementation of ICT in schools in Kenya. These are (1) financial constraints; (2) inadequate ICT infrastructure and

poor maintenance; (3) lack of reliable electricity; (4) inadequate ICT training for principals and teacher; (5) lack of enough technical support; and (6) negative attitudes towards ICT in schools.

Similarly, in the Philippines, Cajilig (2009) summarized the ICT integration problems of her respondents as: (1) lack of ICT facilities: computers, computer room, LCD projector, and Internet connection; (2) lack of software; (3) lack of basic computer competency; and (4) too much time needed for lesson plan preparation. Meanwhile, Bonifacio (2013) enumerated the potential challenges in implementing ICT in the Philippine educational system: (1) deficiency in terms of facilities; (2) lack of teachers' knowledge, skills and sound attitude toward ICT implementation; and (3) unproductive leadership.

This study had its basis on the Technology Standards for School Administrators and Teachers Collaboratives" (TSSA Collaboratives, 2001). It provides standards that focus on the role of educational leaders in enhancing learning and school operations using technology. These standards are indicators of effective management of technology in schools. School heads have a common goal that is to realize a technology-able school environment. The technological needs of the 21st century learners were given preference in the reforms done in education (Beare, 2003).

The present study focused on the ICT leadership of school heads. The school heads were believed to have significant role in introducing and managing technological reforms in education that will benefit the students, teachers, and stakeholders. In addition, this study elicited teachers' description of the actual implementation of ICT in curriculum and instruction. The research also focused on the role of the deans in the local teacher education institutions as main producers of teachers in the four schools division.

The study particularly aimed to propose a school ICT integration model-framework to guide school heads in the DepEd schools in drafting their ICT plan. Specifically, it sought to achieve the following objectives: (1) describe the Information and Communication Technology (ICT) leadership attributes of school heads across the four Schools Division; (2) assess the Knowledge, Skills and Attitudes of Schools Heads as regards their respective management of ICT in their schools;

(3) associate between ICT leadership attribute with the category level of knowledge, skills and attitude; (4) describe the actual implementation of ICT in the schools on curriculum and instruction; (5) correlate between ICT leadership attributes and teachers' views on the actual implementation of ICT in curriculum and instruction; and, (6) describe the practices and challenges that the local Teacher Education Institutions (TEIs) encounter in equipping the pre-service teachers with the knowledge, skills and attitude in ICT-based teaching.

Methodology

2.1. Research Design/Method

This section presents a description of research design, the respondents and participants, the instruments, sources of data, the data gathering procedure, and the data analysis technique.

The mixed method of research was employed in this study. The blending of quantitative and qualitative data offers a more thorough generation of knowledge extracted from the trend in the population along with an in-depth knowledge of the participants' perspective and experiences (Creswell, Plano & Clark, 2007).

Specifically, the concurrent triangulation mixed-method design was used to gather or give details on the richness and complexity of the behavior of the respondents. "By combining multiple observers, theories, methods, and empirical materials, researchers can hope to overcome the weakness or intrinsic biases and the problems that come from single-method, single-observer, single-theory studies. Often the purpose of triangulation in specific contexts is to obtain confirmation of findings through convergence of different perspectives. The point at which the perspectives converge is seen to represent reality" (Jakob & Alexander, 2001).

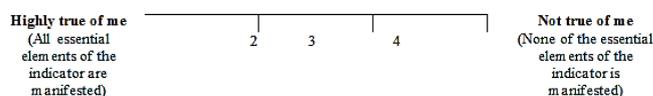
The respondents for the quantitative aspect consisted of seventeen (17) public and private school heads and two hundred seventy-five (275) public and private school teacher while the participants (for the qualitative part) were comprised of three (3) deans of the local teacher education institutions (TEIs). The 17 public schools were selected because ICT is offered as an elective subject, student records are managed through a technology program, activities and

accomplishments are monitored using computers, and ICT integration in all subjects and students' exposure and actual experiences with computers in their hands-on laboratory schedules.

The first survey instrument used - the *Technology Standards Questionnaire for School Administrators* is an originally standardized one from the International Society for Technology in Education (TSSA Collaboratives, 2001). This was modified to fit the purpose of the study by placing the first person "I". This modified form was subjected to content validation by experts to ensure its overall clarity and usefulness in the study. The Technology Standards Questionnaire for School Administrators (2001) consists of inquiries on the following areas of practices of school heads: (1) Leadership and Vision; (2) Learning and Teaching; (3) Productivity and Professional Practice; (4) Support, Management and (5) Operations, Assessment and Evaluation; and (6) Social, Legal, and Ethical Issues.

The questionnaire adopted the following response scale:

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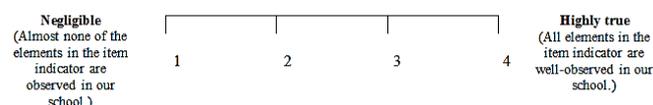
The second survey instrument was a researcher crafted. Prior to its use, said instrument was content validated by a Division Superintendent, Curriculum Division Chief, and a Dean of the College of Education in a private university. The questionnaire's items were validated based on: (1) relevance to the objectives; and (2) language proficiency. The validators' recommendations were included in the final layout of the questionnaire. Specifically, this questionnaire was used to elicit the public and private school heads' knowledge, skill and attitude in the management of ICT which consist of inquiries on the following areas: (1) Knowledge; (2) Skill; and (3) Attitude. There were 18 items in this instrument; it adopted the following response scale:



The third questionnaire is also standardized one similar to the first instrument, but this one was the *Technology Standards Questionnaire for Teachers* that aimed at eliciting the respondents' perspectives on the actual implementation of

Information, Communication and Technology (ICT) in the curriculum and instruction. The original instrument was modified to fit the purpose of the study. This modified form was subjected to content validation by experts to ensure its overall clarity and usefulness in the study, and to ensure that it will yield reliable data.

The questionnaire adopted the following response scale:



Meanwhile, to obtain qualitative data, an Interview Guide was developed to draw out the TEI-participant administrators' description of their practices in equipping the pre-service teachers with the knowledge, skills, and attitude in ICT-based teaching. It was validated by three educational leaders with distinctive positions as Division Superintendent and English major, Curriculum and Implementation Division Chief of the DepEd, and University Research Director with Doctorate degree in Education. Questions were evaluated according to: (1) congruence to the research objective; (2) operational definition of terms; and (3) language accuracy. Suggested recommendations of the validators were incorporated in the final layout of the interview questions.

It is good to emphasize at this point that these two characteristics of research instruments, that is *validity* and *reliability*, were ascertained in all the instruments used in this study: *reliability* is being consistent at a certain level that an instrument should establish in the processes of collecting data, while *validity* is the excellence in data collection procedure that will measure what is supposed to be measured (Best & Kahn, 1998; Denzin & Lincoln, 2000).

To start the data gathering, a letter was addressed to the four Schools Division Superintendent of Region III requesting for the permission to administer the questionnaires to the target respondent-school administrators and teachers. With the permission obtained, the researcher personally conducted the distribution and retrieval of the questionnaires. The items were explained in detail to the respondents for them to figure out

what is asked from them and in order to draw reliable responses.

After completion of the administration and retrieval of the questionnaires, data were consolidated and prepared for the application of appropriate statistical treatment.

Gathered data were simplified and summarized using frequency distribution, mean and standard deviation. Possible correlation was determined by computing for the Chi-square. The Chi-square test for categorical variable was used to investigate whether the measures taken on two criterion variables are either independent or associated with one in a given population (Broto, 2007).

The means of the school heads' self-assessment on ICT Leadership Attributes were verbally interpreted using the arbitrary scale below.

1.00 – 1.75	Very High/Operating Very Well
1.76 – 2.50	High/Implementing Satisfactorily
2.51 – 3.25	Moderate/Implementing With Some Difficulty
3.26 – 4.00	Negligible/Beginning

Meanwhile, the arbitrary scale that was used in teachers' view on the actual implementation of ICT is the following:

3.26 – 4.00	Very High/Operating Very Well
2.51 – 3.25	High/Implementing Satisfactorily
1.76 – 2.50	Moderate/Implementing With Some Difficulty
1.00 – 1.75	Negligible/Beginning

The processing of qualitative data gathered from the interviewees ran from verbatim transcription of participants' responses or stories to the extraction of themes. Significant statements from the three interviewees' transcripts were extracted. Identification was given for significant statements were "D" is for "Dean", small letter "a" as the assigned letter for the sequence of the deans and the numbers being the arrangement of the significant statements. Codes using a process that allowed organizations of the materials "into chunks or segment of text" was later utilized to come up with the emerging themes (Creswel, et.al, 2009 p. 186).

The interviews highlighted the participant-deans' ICT programs for pre-service teachers in their respective institutions as major providers of teachers in the four schools division of Region III.

The triangulation of findings in the quantitative and qualitative phases were later harmonized to come up with the conclusion and its articulation. The pieces of articulation evidence were validated by experts for coherence and logic of triangulation using a systematic matrix of evaluation.

Findings

This section presents the findings of the study. The data are presented based on the sequence of the objectives.

ICT Leadership Attribute of School Heads across the Four Schools Division

For the quantitative section, there were 17 questionnaires that were distributed across the four schools division and all questionnaires were retrieved.

Table 1 shows the school heads' perceptions as regards their ICT leadership attributes.

Table 1: School Heads' Self-Assessment on their ICT Leadership Attributes

ICT Leadership attributes	No. of Responses	Valid Percent
Operating Very Well	3	17.6
Implementing Satisfactorily	4	23.5
Implementing with Some Difficulty	3	17.6
Beginning	7	41.2
Total	17	100.0
Over-all Mean	2.17	SD 1.18

With an over-all mean of 2.17. In general, the school heads may be described as perceiving themselves as implementing with some difficulty as regards ICT leadership attributes.

Of the 17 school heads included in the study, 7 of them have beginning leadership attributes while 4 are implementing satisfactorily. The data suggest that several school heads still need to work on their leadership practices to at least reach workable potentials.

Table 2 shows the school heads' knowledge toward management of ICT. Data reveal that 13 out of 17 school heads were classified as highly knowledgeable, while 3 belong to knowledgeable classification, respectively. It can be surmised that their ICT knowledge could indicate clear capabilities to hone the system toward reaching ICT work in the school.

Table 2: School Heads' Knowledge toward Management of ICT

Knowledge on Management of ICT	Frequency	Percent
Passive	1	5.9
Knowledgeable	3	17.6
Highly Knowledgeable	13	76.5
Total	17	100.0
Over-all Mean	3.65	SD .78

With an over-all mean of 3.65, the school heads registered themselves as highly knowledgeable in the management of ICT.

Table 3 reveals the school heads' skills on the management of ICT. Eleven (11) out of 17 school heads have excellent skills and 3 are good in terms of skills. It may be said that their ICT skills indicate potential to improve the operation of ICT in school.

Table 3: School Heads' Skills on the Management of ICT

Skills on Management of ICT	Frequency	Percent
Weak	1	5.9
Average	2	11.8
Good	3	17.6
Excellent	11	64.7
Total	17	100.0
Over-all Mean	3.41	SD .94

At 3.41 over-all mean, the school heads perceived themselves as having excellent skills on the management of ICT.

Table 4 presents the school heads attitude toward the management of ICT. As the data show, 3 out of the 17 school heads registered themselves as having positive attitude with 12 of them indicating highly positive attitude.

Table 4: School Heads' Attitude toward the Management of ICT

Attitude on Management of ICT		Frequency	Percent
Unfavorable Attitude		1	5.9
Moderately Positive Attitude		1	5.9
Positive Attitude		3	17.6
Highly Positive Attitude		12	70.6

Total	17	100.0
Over-all Mean	3.53	SD/ .87

With an obtained mean of 3.53, school heads registered themselves as having highly positive attitude on the management of ICT.

Table 5 shows the association between school heads' Knowledge on the Management of ICT and ICT Leadership Attribute. Results indicate that knowledge in ICT does not relate with the school heads' ICT leadership attributes.

Table 5: Association between School Heads' Knowledge on the Management of ICT and ICT Leadership Attribute

School heads' knowledge on management of ICT	ICT Leadership Attributes				Total
	Operating Very Well	Implementing Satisfactorily	Implementing With Some Difficulty	Beginning	
Passive	0	0	0	1	1
Highly Knowledgeable	1	1	1	0	3
Knowledgeable	2	3	2	6	13
Total	3	4	3	7	17

Chi square value	P - value	Verbal Interpretation
3.78	.71 (Not Significant)	No Significant Association

The computed chi square value on association between school head's knowledge on management of ICT and ICT leadership attributes is 3.78 with P values of .71.

Table 6 represents the association between school head's skills on Management of ICT and ICT Leadership Attribute. As the results reveal, skills

in ICT does not relate with the school heads' ICT leadership attributes.

Table 6: Association Between School Heads' Skills on Management of ICT and ICT Leadership Attribute

School heads' skills on management of ICT	ICT Leadership Attributes				Total
	Operating Very Well	Implementing Satisfactorily	Implementing With Some Difficulty	Beginning	
Weak	0	0	0	1	1
Average	1	1	0	0	2
Good	1	0	2	0	3
Excellent	1	3	1	6	11
Total	3	4	3	7	17

Table 7 reveals the association between school head's attitude on Management of ICT and ICT Leadership Attribute. Result points that there is no

significant association found which means that attitude in ICT does not relate with the school heads' ICT leadership attributes.

Table 7: Association between School Heads' Attitudes on the Management of ICT and ICT Leadership Attributes

School heads' skills on management of ICT	ICT Leadership Attributes				Total
	Operating Very Well	Implementing Satisfactorily	Implementing With Some Difficulty	Beginning	
Unfavorable Attitude	0	0	0	1	1
Moderately Positive	0	0	1	0	1

Attitude	1	1	1	0	3
Positive Attitude	2	3	1	6	12
Highly Positive Attitude					
Total	3	4	3	7	17

Chi square value	P - value	Verbal Interpretation
9.124	.43	No Significant Association
School head’s attributes on management of ICT and ICT leadership attributes are not associated as indicated with computed chi square of 9.124 and P-value of .43 with verbal interpretation of no significant relationship.		

The 275 questionnaires that were distributed to the teachers in the four schools division in Pampanga were all retrieved.

In Table 8, the summary of the teachers’ views on the actual implementation of ICT on curriculum and instruction are shown. The highest frequency, which is 126, perceived the actual implementation of ICT as operating very well, while 123 looked at it as being implemented with difficulty.

Teachers and school heads significantly agree on their views as regards the implementation of ICT in the curriculum and instruction. However, the data do not include that such implementation leads to efficiency.

Table 8: Teacher’s View on the Actual Implementation of ICT on Curriculum and Instruction

Teachers view on actual implementation of ICT	Frequency	Percent
Beginning	1	.4
Implementing Satisfactorily	25	9.1
Implementing With Some Difficulty	123	44.7
Operating Very Well	126	45.8
Total	275	100.0
Over-all Mean	3.36	SD .66
With an obtained 3.36 over-all mean, teachers view the actual implementation of ICT as operating very well.		

Meanwhile, data on Table 9 show that a positive relationship is found between the teachers’ views on both the ICT leadership attributes of school heads and the actual implementation of ICT in curriculum and instruction.

Table 9: Relationship between Teachers’ Views on ICT Leadership Attributes and Actual Implementation of ICT in Curriculum and Instruction

Bivariate	Pearson r	r ² Coefficient of Determination	P - value	Verbal Interpretation
ICT implementation and curriculum and instruction	-.392	0.1537	.029 (Significant at 0.05 level)	There is positive relationship between ICT implementation and curriculum and instruction

Practices of Local Teacher Education Institutions (TEIs) in Equipping the Pre-service Teachers with the Knowledge, Skills and Attitude in ICT-based Teaching

The three local teacher education institutions are the primary producers of teachers in the four schools division. Participant-deans of the three TEIs covered narrated their practices and methodologies in equipping their pre-service

teachers with the knowledge, skills, and attitudes in ICT-based teaching. These practices shared were obtained through interviews and were believed to be vital in preparing the pre-service teachers in applying ICT-based teaching as the future teachers of the said schools divisions. One important resource in the successful implementation of ICT in school is the ICT competencies of the would-be teachers.

a. ICT-based instruction. The participant-deans unanimously stated that contributory to the delivery of quality ICT-based instruction are proper planning, program design, and the teachers' ability to network with students using the social media. Here are some of the experiences shared:

"Planning the whole college's academic tasks would always be geared in the direction of equipping our pre-service teachers of the knowledge and competencies in the use of ICT in teaching, as well as in their day-to-day studies." – Dean A

"We have Hybrid-ICT based program, it is a designed E-learning platform using ICT." – Dean B

"Most of us in the College are applying and implementing ICT-based instruction. We even have Interaction English, where students and teachers communicate via blogs, posts and social networks." – Dean C

b. ICT knowledge on point. The deans outline the methodologies on how they advocate ICT concepts as part of the fundamental standards in teaching 21st century education. To substantiate the findings are the statement of the participant-deans.

"I do hope that PRC will follow suit for the LET. Anyway, shifting gears to OBE, especially in the professional teacher education courses and specialization or major courses, would equip pre-service teachers of the needed knowledge, attitude and performance in the use of ICT. Curricular activities should not only be focused entirely on the mastery of the concepts and theories but more so on application of such in actual teaching practice." – Dean A

"You could not give what you don't have so kina-complement natin [we complement], we have the

experts, the pedagogy requirement and now we recruit, we recruit experts from outside that will complement and augment the limitations of the university. And we need to bring new talents from outside kase [because] we yung mga [the] professors in the college of education retiring age na [are already within the age of retirement]." – Dean B

"Our students take up education technology and digital technology as part of their curriculum." – Dean C

c. ICT skills developed. The skills defined by the participant-deans were impressive in majority because it communicates positive feedbacks and impact in the career of the pre-service teachers. Here are some of the skills excerpts of the participant-deans:

"Bragging aside, for the past three years, since we became more serious in educational technology, we have been receiving a number of commendations from the cooperating teachers of our student teachers during their practicum. They have been praising the skills of our students in the use of audio-visual materials particularly in making original Power Points and video clips." – Dean A

"Considering the advent of ICT integration considering the requirements of 21st century we could not afford but to prepare our students millennia na tayo e [because we are already in the millennium age], so that the required skill is actually ICT. ICT now is a want, it is a need, it is one of the required skills in order to address various expectations on top of communication on skills is what we call the ICT skill" – Dean B

"ICT. Students are enthusiastic in ICT because it is really a necessity in the teaching profession." – Dean C

d. ICT attitudes focused. They see ICT as inevitable part of 21st century education. The positive attitude of the participant-deans were manifested in the actions of the pre-service teachers in communicating ICT in teaching. Here are the responses affiliated in skills focused.

"In groupings, meanwhile, sometimes I put those who are 'techy' [technologically equipped] together and those who are passive together. But

the same quality resulted – mas maganda pa rin gawing mga techy [it is still better to make them more technologically equipped]. If there are performance-based assessments, make it collaborative so that the leadership skills of the students will also be developed.” - Dean A

“Buddy System. They are not that “techie” they have kase [because] a very positive attitude in learning the computer language.” - Dean B

“We also introduce collaborative work.” - Dean C

e. Dynamic leadership. On the implementation of ICT in the institution of the participant-deans, they stressed on getting the participation of the faculty in curriculum upgrading and/ or planning for the programs to pursue. The following accounts illustrate the dynamism of the participant-deans in the implementation ICT.

“In the research I conducted about ICT-based teaching among our pre-service teachers in 2014. I found out that pre-service teachers do believe that being good in ICT would make the teacher more relevant to the new generation of learners.” - Dean A

“We are now in the process of reviewing our curriculum. It is represented by various colleges in the university including satellite campuses. Hindi siya [It is not] exclusive for the College of Educ, it is multi-disciplinary, across college so we sit down together, kase ano eh [because], some of our professors come from the College of Computer Studies, so they need to understand the uniqueness of Teacher Education, we need to understand the generic requirement therefore when we sit, we sit as one university and one ICT direction.” - Dean B

“I think I have to consult our people on how could we carry out the plan.” - Dean C

f. Physical barriers. The participant-deans shared their experiences in terms of their struggles in the implementation of ICT. According to them, any plan of advancement requires physical resources. This struggle on physical facilities hampers their good intention of carrying-out the technology plans. Quoted below are the responses of the participant-deans.

“Usually it’s the physical facilities. However, I think it’s not really the main problem why ICT-based teaching may not be at its fullest. I think the way how these are managed is the main impediment.” - Dean A

“Resources. Kase our budget is ano e [because our budget is], very scarce, a portion of the budget is allotted for salaries and wages.” - Dean B

“As you know that our students here are not well off, meaning, they can’t afford to buy android phone that could deliver sophisticated features to access technology.” - Dean C

g. Generation and technology gap. On the onset of technology application, the participant-deans stated that there are already existing barriers, and one of them is human challenge. A paradigm shift in favor of ICT instruction for most teachers and students is difficult to realize because of the generation and technology gap. Stated below are some of the participants’ accounts.

“The development of the important behaviors in the use of ICT in teaching is often set aside and not thoroughly achieved even until student teaching. I can still observe our fourth year students that they find it difficult to manage the created multimedia in actual classroom interactions. Probably they lack the practice. During their early years in the college, the teachers would report to me that in the performance assessments, only few can deliver satisfactorily. I asked them if they could still re-make the performance, wala na daw panahon [there is no more time] ‘cause all tasks are geared to the final examinations.” - Dean A

“For the seasoned, no, the seasoned faculty are still depended for [sic] what you call paper-pencil conservative resources but they are now ready to face the challenges and conquer the fear of the unknown kasi hindi nila mundo yan e [because it is not their world.] They finish their academics without computer subjects, nakuha mo [did you get it?] Dean B

“Our students have not yet totally forgotten the traditional pedagogical belief on ICT-based instruction. Some of the classes are still using the

old method, some find it still effective and useful.”
 - Dean C

Discussion

This section presents the results of the study based on the data gathered through the mixed-method of research. In order to postulate a new insight, quantitative results which rest on the school heads’ ICT implementation were triangulated with the qualitative results which on the other hand fixated on pre-service teachers and the inevitability of ICT in the 21st century educational landscape.

Quantitative	Triangulated Insight	Qualitative
In general, the school heads perceived themselves as “implementing ICT satisfactorily”	Pre-service teachers as well as neophyte teachers are good potentials for ICT leadership training and implementation.	Instruction for pre-service teachers is based on ICT
		ICT as inevitable part of 21 st century education

ICT leadership potentials are eyed on the new teacher education graduates who are deliberately trained with 21st century competencies of ICT-based teaching. Newly employed teachers can be considered significant partners for school development and not just as plain classroom teacher. Gone are the days when new teachers are assigned to teach in the lower section and are asked to do some clerical tasks. Now, with their competencies in technology, they can serve as leaders in the training and development of ICT in the school. A paradigm shift in leadership style is needed like collaborative and shared leadership to lead and manage the multiple approaches that support teaching and learning with ICT. Moyle (2006) stated that the school heads recognizes that there are limitations to what a school head can achieve in terms of technology leadership. A team-based approach of leadership, where the leadership capabilities of others are fostered and developed, and the responsibilities of leadership are shared. This will be useful strategy for handling the extent and complexity of the work involved in incorporating ICT into teaching and learning. For teachers to become active members of the learning community and where all personnel contribute to the school’s capacity to include ICT to teaching and learning, shared

leadership model is most effective. Participants linked concepts of participatory decision-making to distributed or shared leadership approaches. Fullan (2005) stated that distributed leadership and shared responsibility are required in any initiative to become successful, while collaboration and partnership with different stakeholders is essential in decision making. Resourceful leaders should explore all avenues of possibilities in promoting technological development to increase access of ICT among the learners (Mwawasi, 2014). School leaders can also establish an ICT committee to assist them in effective ICT integration in school. School heads should act as agents of change and introduce technology committee that would assist them in promoting the development of: (1) a new School Administration Database following a review of the existing databases; (2) a new Content Management System where the committee can assist in reviewing a number of other Content Management Systems precedent to a recommendation of a preferred package; (3) purchase of ICT resources such as laptop, computers, Mac Labs, interactive white boards and data projectors; (4) a committee that will work on mobilizing resources and finding means to resolve ICT issues and concerns in order to work toward maintaining a secured and efficient network of computers; and, (5) staff support in teaching and learning in an ICT rich environment (Gronow, 2007).

Quantitative	Triangulated Insight	Qualitative
In general, the school heads perceived themselves as “implementing ICT satisfactorily”	The school heads are often unable to demonstrate their role as technology leader because their concept of technology implementation is not fully developed. School Heads may view computers only as technology and focus is given to learn about computers.	Instruction for pre-service teachers is based on ICT
		ICT as inevitable part of 21 st century education

It can be inferred that the development of knowledge, skills, and attitudes of the school stakeholders are not separately undertaken to make ICT work in the system. When the leader endeavors to improve one component of the personnel’s competencies, the other significant components are integrated (Yukls, 2002). For instance, if the faculty members are provided with knowledge-based inputs, there should be accompanying skills and attitude development training. Awalt and Jolly (1999) found that the gap of skills and knowledge come from a lack of technology courses in administration preparation as well as few technology in-service courses specifically for administrators. Peterson (2000) found administrators placed a high level of importance on technology knowledge and technology skills to perform professional responsibilities. However, Bishop (2012) found that some school leaders’ were not competent in basic ICT skills, though Gurr (2010) maintains that present-day school administrators should exhibit some basic understanding of ICT in order to perform their duties effectively and inspire the school community to implement it. Sweeney (2012) outlines the roles of school heads in the implementation of ICT. The implementation should focus on (1) planning, organizing and funding; (2) staff development and ICT infrastructure; (3) implementation, improving access and equity; (4) maintenance and sustainability of ICT infrastructure in schools; (5) legal and moral issues of ICT in school; (6) education theory, pedagogy and curriculum improvement; and, (7) general school administration.

Department of Education in relation with ICT implementation. This should achieve its fullest potential. Greater potential can be achieved if school leadership will have clear visions and strategic plans for implementing ICT and newly hired teachers are equipped with relevant ICT competencies. Gurr (2010) observed that school administrators who are visionary, imaginative, and inspirational help to develop same qualities to their staff. To realize the vision of implementing ICT in schools, school heads should start to collaborate, develop, and support visions of other school stakeholders. Researchers have argued that school leadership is a stronger predictor of teachers’ use of ICT in teaching (Anderson & Dexter, 2010; Gurr, 2010, & Bishop, 2012). School leaders who implement ICT programs and share a common vision with teachers stimulate them to use ICT in school (Yee, 2000).

Quantitative	Triangulated Insight	Qualitative
Predominantly, the School heads believed they are highly knowledgeable of ICT.	The educational leaders recognize their role in promoting pedagogical practices as a result of technology integration and the approaches adopted to acquaint with a culture of 21 st century learning.	Knowledge of ICT has been an integral part of learning.
Most of them have highly positive attitude toward use of ICT in the school.		ICT as inevitable part of 21 st century education.
Almost all think they have excellent skills in ICT.		ICT skills is a requisite for 21 st century education.

Quantitative	Triangulated Insight	Qualitative
In general, the school heads perceived themselves as “implementing ICT satisfactorily”	The faculty in TEIs are apparently on the same knowledge generation as the school heads who are considered to be “digital migrants”. Pre-service teachers and new teacher graduates are more closely classified as “digital natives”.	Instruction for pre-service teachers is based on ICT ICT as inevitable part of 21 st century education

The participant-deans unanimously believe that ICT in the 21st century is inevitable. With this, planning for academic task should be geared toward equipping the teachers and students with the competencies in the use of ICT in instruction.

The Department of Education envisions an ICT-supported system of quality basic education for all. It is committed to the appropriate, effective, and sustainable use of ICTs to broaden access to and improve the quality and efficiency of basic education service delivery (DepEd, 2010)

The educational system of the country is heading toward the 21st century learning. Perhaps this can be associated to the number of policies by the

ICTs are powerful tools. When used appropriately these can: (1) increase classroom engagement process; (2) improve the multiple intelligences through multimedia presentation; (3) facilitate comprehension of abstract concepts by making them more concrete; (4) develop basic skills (reading, writing, arithmetic) by giving learners opportunities for practice; (5) provide opportunities for the development of basic skills such as reading, writing and arithmetic; (6) enhance higher order thinking skills such as information literacy, critical thinking and problem solving ; (7) facilitate student collaboration and cooperation through the use of communication tools; and, (10) include learning how to learn as part of lifelong learning skills (Haddad & Jurich, 2002). Today's knowledge economy increasingly requires higher-order thinking, information-reasoning, and collaborative learning skills. Moreover, it also requires teachers and instructional managers to be more learner-centered by being adoptive to individual learning styles and widen their instructional scope across several disciplines. This is the path that ICT-enhanced pedagogy is currently heading. Consequently, that ICT in instruction has created learning environments which challenge teachers and instructional managers to optimize the merging of the skills of questioning and assimilation in order to interpret information in an appropriate context.

The Emerging Paradigm

Figure 1 illustrates a School's ICT Integration Model-Framework. The elements of the figure are three signal lines, a small circle, arrow shaped, and connecting arrow-head line. The main background of the framework is an internet signal connection which characterizes the goal of the study that schools would be connected to the demand of 21st century education which is information and communication. Inside each shape are the emerging new insights of this study. In the arrow shaped objects are the main components of the model-framework focused on student learning and development, faculty enhancement, leadership and collaboration, and resource and infrastructure. Color blue is for student learning and development that represents education, while color red represents readiness of faculty in facing the challenges for enhancement. On the other hand, green is for leadership and

collaboration that signifies fresh ideas/concepts that significantly introduce ICT-based teaching in the light of 21st century education, while yellow embodies reliability with the resources and infrastructure needed for ICT implementation.

The statements reflected on the signal lines explain the output and outcome of the four components of the model-framework. Side by side are *evaluation* and *feedback* for assessment of programs/ initiatives. The arrow encircling the feedback and evaluation means assessment is a cycle. Finally, the topmost arrow gears the four components toward the attainment of the schools' ultimate goal of establishing 21st Century ICT proficiency as represented by the color gray.

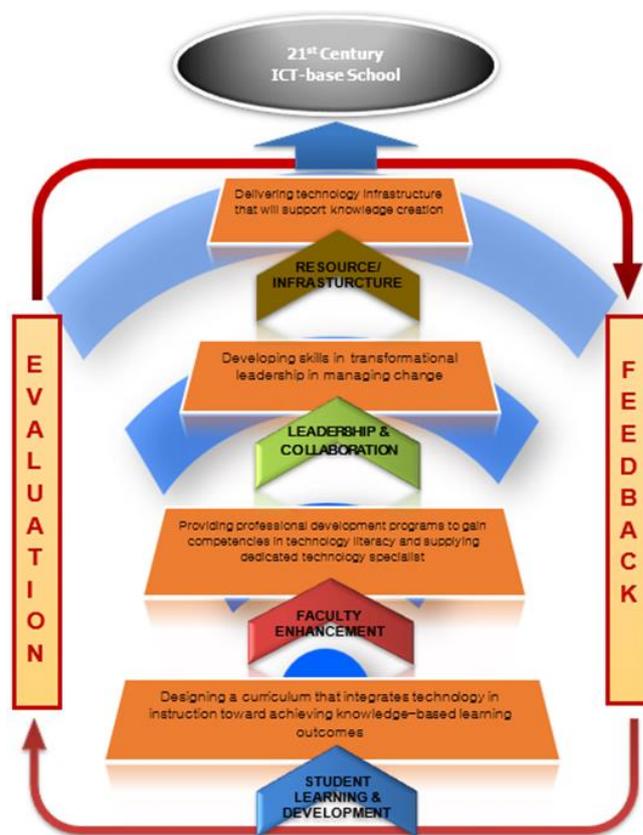


Figure 1. 21st Century ICT-base School Model Framework

Conclusions

Transformation initiatives in schools lays profoundly in leadership with consideration on subordinates' inputs and welfare. Leading a school today should provide directions responsive with technology driven strategies primary of the advancement of technology. The technological leadership competence of the school heads and integration creates a technological learning environment. Thus, acknowledging the potential of pre-service teachers as leaders in providing ICT

training and technology related program implementers.

School leadership should guarantee the best interest of the learners with the effective integration of ICT infrastructure and professional staff training for teaching effectiveness then will lead to increase and directly improve students' academic outcomes.

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