GAUGING THE ICT-BASED TEACHING READINESS OF PRE-SERVICE TEACHERS IN THE LIGHT OF 21ST CENTURY EDUCATION

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Abstract

This triangulation study assessed pre-service teachers of their readiness to functionally utilize Information and Communication Technology (ICT) – based teaching strategies and techniques as corroborated with new graduates' related experiences. Their knowledge in ICT-based teaching acquired from the educational technology courses in teacher education was correlated with their attitudes and perceptions toward the use of these strategies in causing functional learning, their perceived readiness, and technological practices. Subsequently, issues concerning the use of ICT-based strategies learned in college were sought from graduates of teacher education through exposition of experiences in their respective workplaces. This study ultimately revealed that the educational technology course experiences were not responsive enough to capacitate pre-service teachers to enact ICT-based strategies toward functional learning of their future students. They generally believe that their knowledge, potentials, and skills were not adequate to maximize ICT in designing and implementing curricular programs when they become full-fledged teachers despite their positive views on the benefits of ICT in

teaching. New teacher-graduates, meanwhile, experienced limitations on the opportunities to use ICT in teaching due to lack of facilities and available resources to carry out their learned competencies. They also expressed restraint to innovate teaching as they were aghast of the demands of 21st century education. The need to revitalize the teacher education curriculum is, therefore, proposed that should be highly responsive in gearing up the potentials of pre-service teachers on ICT-based teaching in the light of 21st century education.

Keywords

21st Century Ict-Based Teaching, Educational Technology, Pre-Service Teachers, Teacher Education

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1. Introduction

Technologizing teaching is the language of innovation in education (Nelson, 2013). The 21st century classroom is technology-rich that includes the teacher as the empowered leader. The "seismic shift" (Bush, 2013, p. 62) of classroom teaching in this millennium makes information and communication technology (ICT) as the main thrust in the education of the new generation of learners.

This dramatic evolution has seen practices, habits and even people's beliefs shifting to more sophisticated and faster ways to achieve their goals. This is the so-called technology. According to Gentry in Tomei (2002), technology is the application of behavioral and physical sciences, concepts, and other knowledge to the solution of problems. As the social population grows, newer ideas are born as a result of the swelling demands of the society. Competition has started looming over human endeavor, hence, the birth of technology.

As fresh minds hunger for knowledge and learning, education moves at par with the rapidly growing world of expertise. Educational technology occupies the center stage in the state-of-the-art hypermedia instruction. This has challenged educators to update their strategies and techniques in causing learning using technology in education.

Corpuz &Lucido, (2008) cite the Association for Educational Communications and Technology, Washington DC, USA, that "educational technology is a complex, integrated process involving people, procedures, ideas, devices, and organization for analyzing problems and devising, implementing, evaluating, and managing solutions to those problems, involved in all aspects of human learning".

Truly, educational technology has determined how the learning environment in the formal schools developed into a more competent and highly interactive and analytical educational setting. Instruction has gone far regarding the techniques in teaching since the infusion of computers and the internet in the schools. The traditional chalk board method has seen its giant rival in multi-media instruction. The textbooks have found a total alternative in hyper-media resourcing. However, the need to update in-service teachers to their new roles as learning facilitators (Divaharan, 2011) and induct the pre-service teachers to the world of ICT-based teaching that is learner-centered (Lee et al., 2007) emerges.

It is, therefore, noteworthy to consider whether the teachers and would-be teachers are ready to embark with the fast growing technology in education. There are a wide range of computer software, educational applications, multi-media and hyper-media resources from the net and World Wide Web that can be utilized to maximize the teaching-learning experience. Could teachers be able to manage such techniques in teaching? Could pre-service teachers be ready enough to face the challenge?

(Roblyer & Edwards, 2000) state that a teacher should develop a philosophy of technology which is integrated in the instruction. It is beneficial to consider that a teacher needs to set his vision towards "technologizing" instruction. As new generations of students take place in the academe, newer and more updated demands come about. Each year, the teacher updates his technological methods to meet the growing exigencies. The teacher sets at least a foot ahead of the students as far as technological growth is concerned.

The pre-service teacher's learning experiences in the University are an excellent, if not the ultimate, opportunity to prepare him for a functional ICT-based instruction. While his attitude determines how much he could achieve the competencies, strategies and techniques, actual practice is inevitable to enhance his skills in managing such technology in instruction.

Readiness is a highly variable and complicated word to consider. This entails a number of points to satisfy for an individual to be considered as "ready". It is quite easy to merely say that one is ready to face a certain task. However, along the way, problems arise that would just consequently lead to worse scenarios, hence, the miscalculations of readiness.

Readiness, in the holistic sense, involves the readiness of the mind, heart and the physical body – the cognitive, affective and psychomotor domains, respectively (Schaffer, 2004). Pre-service teachers may be said ready when equipped with the necessary information and

knowledge of the teaching strategies (cognitive), the positive attitude to sustain their interest to move on (affective), and congruent manual skills and practices in doing all these ICT tasks in teaching and personal development (psychomotor).

The proponent of this study has observed that today's generation started to cling tight on the rapid growth of ideas and know-how. Technology evolved in various fashion. People continued to delve on a large range of interests in ICT. Mass media has embarked on the same technology to fulfill its purpose. With the advancement of technology, teaching and learning should have become highly accessible anytime, anywhere (Fu, 2013). There are, however, challenges that continue to get in the way (Bingimlas, 2009).

In Science teaching, meanwhile, Bingimlas found three major barriers why ICT cannot be in full swing: "lack of confidence, competence, and accessibility to resources" (p.9). Gomes (2005), however, saw that "lack of training in digital literacy and lack of pedagogic and didactic training in how to use ICT in the classroom are the major obstacles" (p.12) which make teachers hesitant to fully utilize ICT in teaching.

These barriers may likely be the same story in Philippine education particularly in teacher education. Most pre-service teachers nowadays also belong to the digitally enthusiastic circle though more greatly indulge with social networking and sourcing for personal gain.

In some related reports, it appeared that the use of technology in the studies of Singaporean pre-service teachers is not directed to designing pedagogies for one's future teaching career (Sing Chai et al., 2011). However, a comparative study of Singaporean and Taiwanese pre-service teacher revealed that technology integration in teacher education is geared toward making them more affirmative to constructivist teaching (Sing Chai, et al., 2009). On the other hand, ICT integration in teacher education in Indonesia has found its prominent place in the strategic planning exercises of universities (Lim & Pannen, 2012).

In the Philippine Tertiary Education, pre-service teachers are trained to manage, administer and manipulate ICT-based learning resources. Lucido (2012) expresses that future teachers should develop in themselves higher order thinking skills as they embark with the ICT-based teaching. Using technology does not only allow teachers to make use of any multi-media resources but also requires them to be critical and analytical. Technological teaching is not only exhibiting the wonders of human creation. It is likewise the development of sensible thinking, logical reasoning and creative generalization among students. Therefore, the teacher shall

possess such in the first place. Their training in college is vital in their formation, thus, an important predictor of their readiness to become effective educational technologists.

In another study, pre-service teachers' acceptance of the ICT-based teaching as a pedagogical framework is grounded on their "perceived usefulness and ease of use" of technological tasks (Teo, 2012, p.199). It can be inferred, therefore, that the acquisition of competencies in technologizing teaching strategies is a continuing process.

The Commission on Higher Education (CHED) of the Philippines side-by-side with the Philippine Association for Teacher Education (PAFTE) re-engineered the curricular program of Teacher Education in the tertiary level with the demands of modern technology. In line with this task, technical and professional courses with field study were integrated in the programs for Elementary and Secondary Teacher Education. Information and Communication Technology and Educational Technology courses respond to such demands.

Pre-service teachers are familiarized and equipped with the necessary skills in information and communication technology. Hands-on applications pertinent to the job of the teacher are being provided in the early levels. Teaching strategies and techniques in education complement such skills to prepare and equip pre-service teachers for the real work in the schools (CHED Memo Order No. 30, series 2004).

It is believed that this situation can be realized should there be enough skilled manpower ready to fit in the ICT world. Thus, this research tried to; at least, identify a certain community of would-be teachers who will soon be competing with the anchor of time – the ICT-based instruction.

Would they be ready to commit their hearts in "automating" their attitudes to move on? Would their knowledge be apt to sustain their minds to take control over the fragile system? Would their fingers be capable of pressing the right combination of buttons to enter the technological labyrinth and survive? These are just few of the questions to answer to make sure that a pre-service teacher may be deemed ready to do ICT-based teaching.

Debates on the real teaching competencies responsive to the demands of 21st century continue in re-engineering the curriculum in teacher education (Lewin, 2004). The misconception regarding the use of information and communication technology in the schools continue to create anxieties among teachers, old and new, or even future teachers. Kallick and Wilson (2001) reveal the misconception that ICT-based teaching is often construed as ICT

teaching. People tend to expect teachers to train their children to use computers efficiently. In the book of Morrison and Lowther (2005), it is exemplified that the schools are viewed as training ground for student development. Training, in the sense that students perform the drill-and-practice way of using computers in the classroom, is an important ingredient in facilitating the learning of skills to allow them create interactively.

ICT-based teaching is "student-centered" (Lucido, 2012, p.66), that is, the integration of the use of computers, internet, and other electronic means jive with what future learners need. Awareness of the role of ICT in teaching should motivate pre-service teachers to ready their skills and attitude in order to cope with technological learning (Teo, 2010). The pre-service teacher needs to be equipped with the necessary information and basic concepts about ICT and educational technology in order to build up his/her confidence to implement technological pedagogies (Lewin, 2004). These include teaching strategies and content, basic and functional terms, protocols and procedures, learning competencies, software and hardware features and functions, student experiences, and a lot more.

These information and inputs are taken up in the tertiary level for teacher education students. The content of ICT-based teaching is underscored in technology courses. In this perspective, it can be inferred, however, that the instructional intervention for pre-service teachers be structured appropriately and adequately. As suggested by Morrison and Lowther (2005), ICT-based teaching is not only concerned with the content learning and teaching. It is also concerned with the proper attitude the teacher has to manifest and demonstrate. They claim that technological attitude goes with knowing the roles of the job. These roles are basically the curriculum developer, the classroom manager and learning evaluator.

Shelly et al. (2012) pose that along with promoting analytical and independent learning, the teacher also uses ICT in the form of word processing, spreadsheets, databases, publishing and presentation, internet resourcing and using educational software as instructional technology, audio-video devices and/or interactive techniques.

Are the three foregoing points characterizing a good ICT-based teacher (knowledge, attitude and skills) make a pre-service teacher ready to embark with the global demands in education?

In this research, these points were used to assess the readiness levels of pre-service teachers on ICT-based teaching. To couple such assessments is the self-assessment of readiness

by the pre-service teachers themselves. These justifications and comparisons may be ample to sketch curricular reform in teacher education making ICT-based instructional strategies and techniques at the forefront of pre-service teacher training.

1.1 Objectives of the Study

This study generally aimed to assess how ready are pre-service teachers on the use of ICT – based instruction as may be influenced by their knowledge of ICT and ICT-based instruction, personal attitudes toward the said teaching strategy, and technological practices as well as their perceptions on their own readiness. This also probed into the experiences of newly hired basic education teachers on the use of ICT in their teaching tasks. These data served as bases for the drafting of a framework. It specifically tried to investigate on the following questions: (1) what are the perceived attitudes of pre-service teachers towards using ICT-based instruction? (2) How do they perceive their readiness to carry out ICT-based instruction? (3) What are their observed technological practices in enhancing themselves to be ICT-based teachers? (4) Is there a significant relationship between the pre-service teachers' levels of knowledge on the content of the Educational Technology Curricula and their (a) perceptions on their readiness to carry out ICT-based instruction, (b) perceived personal attitudes towards ICT-based teaching, and (c) observed technological practices for enhancement of ICT skills? (5) What problems and difficulties concerning ICT-based teaching were met by new basic education teachers in the schools?

2. Method

This study utilized the triangulation approach that integrated findings in descriptive research with techniques of survey and correlation and in the exposition of experiences Creswell & Plano-Clark (2007). It primarily attempted to assess and describe the level of knowledge on ICT-based instruction of the pre-service teachers as well as their perceived readiness and technological practices in education. The degree of relationships among these variables were considered to illustrate how consistent are these salient points in keeping pre-service teachers up with the trends in ICT-based teaching. These data were provided by the 44 student teachers (senior students) and 48 field study students (junior students) during the school year 2013-2014,

who actually comprised the total enrolment in the same teacher education institution where the researcher is employed.

To amass the various problems, difficulties and limitations of teachers in the schools as regards the use of the ICT-based instruction, 12 newly employed basic education teachers who were graduates of batches 2012 and 2013 provided the information for this end.

In gathering the significant and relevant data for analysis, the final grades of the pre-service teachers in the two Educational Technology courses were considered. Their average grades determined their level of knowledge of ICT-based teaching. In the earlier parts of this study, the Philippine government prescribed the content and competencies to be mastered by the pre-service teacher as regards technological pedagogies. Therefore, their achievement in the said courses significantly represents their knowledge on ICT-based teaching.

Two sets of questionnaires were utilized in this study – (1) Assessment of pre-service teachers' attitudes towards ICT-based teaching, their perceived readiness and their technological practices concerning their studies and school tasks; and (2)Assessmentof the problems, difficulties, and limitations met by newly employed basic education teachers in their respective schools. The items in the first survey instrument were based on the literature review and the attributes of an ICT-based teacher resulting from previous studies. The pre-service teacher respondents rated the items based on a four-point scale – most likely, more likely, less likely, and least likely – that describes their perceptions / attribution of themselves on each of the items.

In the various surveys in this study, the simple mean was used to describe the responses of pre-service teachers on their attitudes, perceived readiness, and technological practices considering their level of knowledge in ICT-based instruction obtained through the use of the first survey instrument. Meanwhile, the chi-square test of independence was utilized to measure the relationship between and among the former variables.

The second survey instrument was a checklist of possible experiences and scenarios related to the use of ICT-based teaching in basic education schools (kindergarten, elementary, secondary). The new basic education teachers answered "yes" or "no" to describe whether or not such events were experienced and/or done. The researcher later probed into the details of these experiences through a follow-up interview with each of the participating teachers. Coding,

classifying, and iterative validation (Cresswell & Plano-Clark) were strategically used to draw up emerging themes for discussion.

The quantitative results and qualitative findings were triangulated that consequently provided the theories and principles considered in the formulation of the curricular reforms for pre-service teachers regarding ICT-based teaching.

3. Results and Findings

3.1 Perceived Readiness, Attitudes and Practices.

Sets of information in this portion present how ICT-based teaching readiness, attitudes and practices of pre-service teacher respondents may be described.

Table 1: *Attitudes of pre-service teachers towards the use of ICT in teaching*

Attitude toward ICT-Based Teaching	Mean response per Level of Knowledge - Group				Verbal Interpretation (on the overall data)
	Above Average	Average	Below Average	OVERALL	
1. being an important tool in teaching and learning.	4.0	4.0	4.0	**4.00**	Highly Positive
2. learning ICT as a continuous process	3.5	3.3	2.4	**3.07**	Positive
3. better than non-electronic means	3.1	2.8	2.5	**2.82**	Positive
4. higher-order thinking skills are achieved better and faster	3.0	3.2	2.9	**3.04**	Positive
5. online resourcing as a strong means to gather relevant data	2.8	2.9	3.3	**2.96**	Positive

*Average **3.18**　　Positive*

(Table 1) exhibits that the respondent pre-service teachers generally think positively about the use of ICT in teaching (average mean of 3.18) and in learning, as well. Having a mean of 4.0, this perfectly describes that these students consider the use of ICT in teaching as a highly salient feature of modern teaching. Though positively perceived, when it is compared with other means of teaching and learning such as the use of chalkboards and the library, ICT is fairly accepted with means at 2.82 and 2.96, respectively, the lowest among the items.

Table 2: *Perceived readiness of pre-service teachers in using ICT-based strategies and techniques*

Perceived Readiness	Mean response per				Verbal
	Level of Knowledge - Group				Interpretation (on the overall data)
	Above Average	Average	Below Average	OVERALL	
1. To be a good ICT-based teacher in the future	3.4	3.1	3.1	**3.18**	Moderately Ready
2. Has the necessary skills in ICT-based teaching	3.1	3.0	2.9	**3.00**	Moderately Ready
3. Can make future students learn using the ICT-based strategies and techniques	3.4	3.4	3.1	**3.32**	Moderately Ready
4. Able to use ICT to think analytically and critically	1.6	1.7	1.5	**1.61**	Not Quite Ready
5. Adept in obtaining necessary information from the internet	3.0	3.1	3.0	**3.04**	Moderately Ready

Average 2.74 Moderately Ready

The foregoing table reveals that respondent pre-service teachers believe that they are moderately ready in terms of using ICT-based strategies and techniques as regards general performance, skills, competencies and internet sourcing. The mean scores range from 3.0-3.3. However, when it comes to analytical and critical thinking through ICT, they are not necessarily confident with a mean score of only 1.61.

Table 3: *Self-assessment of pre-service teachers of their ICT practices for educational purposes*

Self-assessed ICT practices in:	Mean response per Level of Knowledge Group				Verbal Interpretation (on the overall data)
	Above Average	Average	Below Average	OVER ALL	
1. doing student-teaching tasks	3.3	3.4	3.6	**3.43**	Good
2. surfing the internet for educational research	3.5	3.4	3.4	**3.43**	Good
3. downloading pictures, images, data, clips, articles, etc. necessary for school tasks	3.5	3.6	3.6	**3.60**	Very Good
4. communicating and transmitting documents through emails, social networks, groups	3.9	3.5	3.5	**3.61**	Very Good
5. preparing and organizing school tasks, projects, and paper works	3.6	3.7	3.4	**3.60**	Very Good

Average 3.18 Very Good

The respondent pre-service teachers consider their ICT practices to be generally good as summarized in (Table 3). With mean scores ranging from 3.43-3.61, they thought that they are good enough as practitioners of ICT both in their academics and in the preparation of student-teaching tasks.

Table 4: *Relationship of the pre-service teachers' knowledge in educational technology with their attitudes, perceived readiness, and ICT practices*

Variable	Chi-square value	Interpretation
Attitude towards ICT-based teaching	5.96	
Perceived readiness to use ICT in teaching	2.44	Not significant
ICT Practices for educational purposes	2.87	

The figures in (table 4) are way below the χ^2 critical value of 12.59 with 6 degrees of freedom at α = 0.05. The levels of knowledge of the pre-service teachers regarding ICT-based teaching drawn from their grades in their educational technology courses do not significantly relate with their attitudes, perceived readiness, and ICT practices.

3.2 Problems, Difficulties and Limitations In it-Based Teaching.

Table 5: *Problems, difficulties and limitations experienced by newly hired basic education teachers on ICT-based teaching activities*

ICT-based teaching practices	Response (%)		Problems, difficulties, limitations
	Done	**Not Done**	
1. Online interactive teacher-students meetings	20	80	- Meeting only through Facebook for personal matters (3). - Don't know how to do it (3) - Not yet suitable for young pupils (2) - No access to these networks (2) - Students are not interested. - Time consuming - No internet connection
2. Surfing internet for research and downloads	93	7	- No internet connection - Our textbooks are already enough.
3. Organizing school tasks and reports using computer applications	93	7	- Required to write lesson plans on notebooks not in computerized form.
4. Computing grades and the like using computer applications	80	20	- Have very few students, can be done manually (2) - More difficult than using calculator
5. Making lesson presentations with the use of relevant applications	60	40	- No enough time to prepare presentations(3) - The school doesn't have digital projector that's why no need to prepare. - Not confident to do it
6. Preparing databases of student records for storage and easy retrieval	53	47	- Don't know how to make (4) - No application available (2)
7. Creating video clips and other hypermedia instructional aids	40	60	- Don't know how to make it (2) - Not created, just downloaded (2) - No time to do it.

			- No facilities for that - Using only what are available in the school
8. Networking in professional groups online	27	73	- Don't know any - No time to search - Never tried because it's a stranger - Don't know about these things - Not interested in this group - No internet connection

(Table 5) expounds that online interactive teacher-students meetings and professional networking are the most limited and most difficult to perform by the newly-hired basic education teachers at 80% and 73% non-delivered ICT tasks, respectively. Meanwhile, surfing the internet and using Office® applications appeared to be the most facilitated tasks. The most remarkable reasons of seldom to non-use of networking are the lack of knowledge about the pertinent applications and software, and the unavailability of facilities and equipment in their workplace.

4. Discussion

4.1 Perceived Readiness, Attitudes and Practices

Attitude toward ICT as a means in teaching spells a great deal of performance in modern teaching strategies and techniques. The pre-service teachers generally manifest positive considerations. They do believe that ICT is very important in carrying out the teaching-learning tasks in the school. Although, not attitudinally inclined into ICT all throughout, they still allow the use of the traditional methods in teaching. However, they perceive highly enough that ICT is an effective tool to motivate students to think critically and analytically.

Having a very high regard to ICT as tool in teaching and learning, pre-service teachers can be considered to be good potentials to make technology flourish in modern teaching. This suggests that the great deal of talents capable to bring up Philippine education in the big screen is up for grabs. Pre-service teachers can manage the trick. However, some barriers loom the attainment of this goal. Findings indicate that pre-service teachers still give high regard to non-electronic, or the so-called traditional, techniques. Their confidence to use more sophisticated instruments is still feeble (Bingimlas, 2009).

It can be inferred that the kind of pre-service training they had was not adequately reinforced with the use of ICT. Gomes (2005) raised the imperative on the pedagogic exposure of pre-service teachers related to educational technology. Their morale is yet to be boosted to

realize that highly traditional means of teaching is not anymore relevant in today's generation of learners.

In terms of how they perceive themselves as regards ICT-based teaching, pre-service teachers believe that they are ready to face their students' learning concerns because they are equipped with the necessary knowledge and skills. While they think that the practices they do in college make them better, they are still anxious on how to translate such practices into motivational means to make their future students think analytically and critically. These data suggest that pre-service teachers do not only need to be equipped with the knowledge, skills, and practices on the technical aspect of ICT to make them well-prepared and trained. They also need to be taught about how these things can be utilized to ladderize the thinking skills of students and cause functional learning.

These findings corroborate with that of Bingimlas (2009) that pre-service teachers are basically adept in the use of computers for personal gain but "they lack effective training, accessibility, and support (p. 242)" to make ICT work for them in teaching.

Pre-service teachers may only consider themselves ready to the 21st century ICT-based teaching when they are able to use technology responsively to the demands of their personal and professional growth and their future learners more than the mere presence of highly sophisticated gadgets.

This generation of young men and women are very much familiar to the fast growing technology especially computer applications, hypermedia, and internet. Pre-service teachers are one of them. Unlike those a few years back, they would always infuse electronic and digital technology in their projects, reports, demonstrations and portfolios. They never miss a day without visiting their social networks. Lucido (2012) explains that the social connection of students manifests their obvious practice of the rapidly expanding communication networks. Aside from being connected, being adept in other competencies such as internet researching, creating multimedia and hypermedia projects as instructional aids, is also a great indication of outstanding technological practices.

In this study, the level of knowledge determined in the Educational Technology courses of a pre-service teacher does not influence his/her attitude, perceived readiness, and technological interests. (Geiser &Futrell, 2000) propose that the technological curricula should

commit to gear up students' attitudes leaning to the development of oneself in using technology to think better, feel better, and do better. If achievements in the educational technology courses do not significantly relate with students' attitude, readiness and practices, there might be some missing link in the curriculum for teacher education. Further in this study, no matter which level a pre-service teacher would be, his/her perceived readiness and technological practices will not differ. Above average performers may simply feel the same and do the same as those in the average and below average groups. These ideas may suggest that the present curricular tasks in the said courses are not that responsive to equip the pre-service teachers of the necessary attitude, readiness and practices to be ICT-based teachers in the future.

4.2 Problems, Difficulties and Limitations in ict-Based Teaching.

On the perspectives of the newly-hired basic education teachers, social networking marks the most difficult and most limited area in the ICT-based teaching tasks. This means that communication problems exist among teachers to augment teaching-learning experiences and to improve one's personal and professional development.

In the study of Gomes (2005), the use of internet by teachers to connect with their students is quite a struggling episode in science teaching in Portugal. Teachers may have the drive to maximize online resources. However, due to inadequacy of facilities, many resort to unstructured means.

Direct teaching is still prevalent nowadays in which the teacher provides the necessary knowledge and information for students to grasp and master (Corpuz & Salandanan, 2013). Up to now, even the new breed of teachers believe in this method of teaching. This study may have not dealt with the nature of the learners of today but such method appear to be becoming irrelevant. ICT-based teaching is the thing of the present (Bender, 2012). Millennial learners often demand for diverse teaching strategies in which the teacher facilitates "instant communication and amazing command of factual content" (p.79). Students are too eager to explore their interests about the raised information in class. The pre-service teacher, therefore, has to have the learning opportunity to enjoy ICT as means to differentiate teaching for their practical training (Haythornthwaite & Andrews, 2011). Probably, these are what Philippine Teacher Education Institutions miss in the integration of the prescribed curriculum.

The in-service teachers, nonetheless, expressed their appreciation of being provided with the relevant theories in educational technology. It can be inferred that the current pre-

service teacher education training is still on the focus of mastery of the content and competencies but yet to reach the full gear of constructivism in the pedagogies (Sing Chai, et al., 2009). Inclusion of ICT training among teacher educators and pre-service teachers to strategic plans is an impetus to curricular transition (Lim & Pannen, 2012).

In the social dimensions of teaching, developing human interaction through electronic means is also seen as a factor of 21st century teaching and learning (Tamayao, 2013). The issue on "digital divide" (p.199) exists as the teachers' connection with their students is at stake. Stepping into the threshold of teaching digital natives may seem to be archaic due to almost permanently diverse perceptions between the teacher and modern learners.

ICT, on the other hand, finds its course in the new breed of teachers. This study saw their relevant capabilities, at some point, in manipulating information and communication as regards their academic tasks. Emailing and short messaging may be prevalent. However, online blogging and journaling are often skipped.

The low drive of new teachers (or even pre-service teachers) in documenting, organizing and publishing significant phenomena in the teaching-learning environment could be a symptom of impassiveness to global communication (Shelly et al., 2012). As the 21st century education gears up to more global perspectives and collaboration, it is an imperative that teachers create their knowledge spheres making their ideas known to the worldwide public (Romero, et al, 2014). This would simply make them academically connected worthy as models of educational technology to their students.

On the constructivist point of view, these neophyte teachers apparently find it difficult for them to establish the "knowledge society" (Tan, et al, 2014, p.9), that is, the academic circle that is able to produce beneficial knowledge drawn from research and online resourcing. However, the usual computer applications such as documents, worksheets, presentations and publications are well observed and practiced, thus, adept in data processing. This is a similar finding by Luterbach (2013) that many teachers use computers in school as mere machines to process their documents but not necessarily creating instructional and educational software.

5. Conclusion

The knowledge of pre-service teachers on the principles and strategies in educational technology is not a significant factor to build up their attitudes to maximize ICT in teaching 21st century learners. Their course tasks do not also boost their confidence to get prepared for more

analytical and critical way of teaching using ICT. Newly employed basic education teachers saw themselves efficient in the clerical aspect of ICT in doing their routines as teachers. However, their lack of exposure to online practices suggest their ineptitude to make ICT work in developing learners' 21st century competencies. It is, therefore, recommended that educational technology and strategy courses in teacher education be enriched with application tasks in networking, online interaction, and production of courseware and modules on top of the usual word processing and online researching. On the other hand, traditional techniques in teaching should not be totally scrapped, instead, be innovated to make them more manipulative and thought-provoking when utilized side-by-side with modern ones.

6. Recommendation

Educational Technology courses should primarily deal with the theories and principles of teaching in the 21st century. This study advocates the integration of modern and traditional strategies and techniques in teaching and learning.

ICT-based teaching strategies specifically include networking, journaling, manipulating and managing software applications, hypermedia making, among others. The pre-service teachers may be trained with these one-after-the-other. For the purpose of concentration and mastery of the skills, simultaneous performance of these strategies is not advisable.

As the data in this study suggest, the traditional teaching techniques are still significant since most destination schools after graduation are still limited in terms of technological opportunities. Such techniques include the use of the chalkboard (or whiteboard), charts, graphs, models, figures, pictures, posters, and the like.

Usual as they are, their availability and usage are still prevalent in almost all schools in the Philippines nowadays. Similar to the foregoing process, these techniques are utilized continuously. They are paired with ICT-based strategies to add up to the variety of activities in instruction.

Both approaches, ICT-based and traditional, start with an assessment of the student learning competencies to identify the specific targets necessary in accomplishing a plan. The activities will then be based on the points stressed in the plan. An evaluation of the outcomes as against the assessment, plan and the activities wraps up the course to describe the responsiveness and effectiveness of the ICT-based strategies and teaching techniques used.

Lucido (2007, p.35) believes that learning in the "ICT-based instruction allows students start with meaningful learning then to discovery, generative, and finally to constructivism". As the courses progress, pre-service teachers are to involve in research concerning ICT-based teaching. This stage allows them to ascertain new meanings and trends (meaningful). These are followed by practice and field study to find out the applicability of such concepts and theories (discovery). These activities should generate inferences and hypotheses that pre-service teachers are provoked to probe into them and draw analytical and critical reasoning (generative). Creating concrete evidence of learning and thinking, such as audio-video documentation of issues and problems, publication of narratives, blogs and journals of learning experiences, social networks, etc., tops it all up (constructivism). Allowing the stages to move back permits pre-service teachers to assess their terminal outputs and refine them to come up with outstanding outputs necessary to improve and enrich the concepts and theories of ICT-based teaching responsive to the demands of the 21st century.

References

Bender, W. (2012). Project-based learning: differentiating instruction for the 21st century learning. CA, USA: Corwin, a SAGE Company

Bingimlas, K. (2009). Barriers to the successful integration of ICT in teaching and learning environments: a review of the literature. Eurasia Journal of Mathematics, Science and Technology Education, 5(3), pp. 235-245.

Bush, M. (2013). Educational technology points of inflection. Educational Technology: the magazine for managers of change in education, 53(1), pp. 61-63.

Chai, C., Hong, H., and Teo, T. (2009). Singaporean and Taiwanese Pre-service Teachers' beliefs and their attitude towards ICT use: a comparative study. The Asia-Pacific Education Researcher, 18(1), pp. 117-128.

Chai, C. & Tsai, C. (2011). Exploring the factor structure of the constructs of technological, pedagogical, content knowledge (TPACK). The Asia-Pacific Education Researcher,

20(3), pp. 595-603.

Corpuz, B. & Lucido, P. (2008). Educational technology 1. Quezon City, Philippines: Lorimar Publishing Inc.

Corpuz, B. &Lucido, P. (2012).Educational technology 1, second edition. Quezon City, Philippines: Lorimar Publishing Inc.

Corpuz, B. &Salandanan, G. (2013). Principles of teaching 1, third edition.. Quezon City, Philippines: Lorimar Publishing Inc.

Creswell, J. & Plano-Clark, V. (2007). Designing and conducting mixed methods research. California, USA: SAGE Publications, Inc.

Divaharan, S. (2011). Learning new technology tools in pre-service teacher education: a model for instructional approach. Proceedings Ascilite 2011 Hobart: Full Paper, pp. 352-362.

Fu, J. (2013). ICT in education: a critical literature review and its implications. International Journal of Education and Development using Information and Communication Technology (IJEDICT), 9(1), pp. 112-125.

Geiser, P. &Futrell, M. (2000). Teachers, computers, and curriculum: microcomputers in the classroom. MA, USA: Allyn & Bacon, A Pearson Education Company

Gomes, C. (2005). Integration of ICT in science teaching: a study performed in Azores, Portugal. Recent Research Developments in Learning Technologies.

Haythornthwaite, C. and Andrews, R. (2011).E-learning theory and practice. CA, USA: SAGE Publications Ltd.

Kallick, B. & Wilson, J. (2001). Information technology for schools: creating practical knowledge to improve student performance. CA, USA: Jossey-Bass Inc.

Lee, C., Teo, T., Chai, C., Choy, D., Tan, A., and Seah, J. (2007) Closing the gap: pre-service

teachers' perceptions of an ICT-based, student centered learning curriculum.Ascilite Singapore 2007 Proceedings, pp. 554-562.

Lewin, K. (2004). The pre-service training of teachers – does it meet its objectives and how can it be improved? Background paper for the EFA Global Monitoring Report, pp. 1-33.

Lim, C. &Pannen, P. (2012).Building the capacity of Indonesian education universities for ICT in pre-service teacher education: a case study of a strategic planning exercise. Australian Journal of Educational Technology, 28(6), pp. 1061-1067.

Lucido, P. (2007). Educational technology 2: selection, production, and utilization of appropriate technology tools in instruction. Quezon City, Philippines: Lorimar Publishing Inc.

Lucido, P. (2012). Educational technology 2, second edition. Quezon City, Philippines: Lorimar Publishing Inc.

Luterbach, K. (2013). Building software development capacity to advance the state of educational technology. Educational Technology: the magazine for managers of change in education, 53(2), pp. 21-27.

Morrison, G. & Lowther, D. (2005).Integrating computer technology into the classroom (3rd edition). NJ, USA: Prentice-Hall, Inc., Pearson Education, Inc.

Nelson, A. (2013). Design of the technology-rich classroom practices and facilities environments.Educational Technology: the magazine for managers of change in education, 53(6), pp. 3-12.

Roblyer, M. & Edwards, J. (2000).Integrating educational technology into teaching (2nd edition). NJ, USA: Prentice-Hall, Inc., Pearson Education, Inc.

Romero, L., Orzechowski, A., &Rahatka, O. (2014).Teaching problem-solving and critical-thinking skills online using problem-based learning.Educational Technology: the

magazine for managers of change in education, 54(1), pp. 20-25.

Schaffer, R. (2004). Introducing child psychology, USA: Blackwell Publishing

Shelly, G., Gunter, G., & Gunter, R. (2012).Teachers discovering computers integrating technology in a connected world (7th edition). USA: Course Technology, Cengage Learning.

Tamayao, A. (2013). Social dimensions of education. Manila, Philippines: Rex Book Store, Inc.

Tan, S., Ow, J., Chai, C., Teo, C., and Yeo, J. (2014). Research on education in the knowledge creation paradigm. Educational Technology: the magazine for managers of change in education, 54(1), pp. 8-13.

Teo, T. (2010). Path analysis of pre-service teachers' attitudes to computer use: applying and extending the technology acceptance model in an educational context. Interactive Learning Environments, 18(1), 65-79.

Teo, T., Ursavas, O., and Behcekapili, E. (2012). An assessment of pre-service teachers' technology acceptance in Turkey: a structural equation modeling approach. The Asia-Pacific Education Researcher, 21(1), pp. 191-202.

Tomei, L. (2002). The technology façade: overcoming barriers to effective instructional technology. MA, USA: Allyn & Bacon, A Pearson Education Company.