Teachers’ Competency in Information and Communication Technology of Selected Secondary National High Schools of Nueva Ecija Philippines

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Abstract

The study was conducted to determine the ICT competency of teachers in the Congressional District II of Nueva Ecija. One hundred thirty one (131) teachers and four (4) school principals were sampled from the four schools namely: Constancio Padilla National High School, Doña Juana Chioco National High School, Muñoz National High School and Rizal National High School. There were two sets of questionnaires administered, one for the school principals and another for teacher-respondents. Results of the analysis revealed that 94 or 71.76 percent of the teacher-respondents were females and most of them were considered young teachers (84 or 64.12%) with a mean age of 36.20 years old. More than half (76 or 58.02%) of teacher-respondents were BS degree holders with MA/MS units and only few (10 or 7.63%) of them were Master’s degree holders. Most (83 or 63.36%) of the teachers were science related majors and nobody among the teacher-respondents finished Information Technology or other related ICT courses. The overall ICT competency of teachers is described to be Intermediate. The ICT competency of teachers in the two domains, Technology Operations and Concepts Domain and Social and Ethical Domain with a mean of 2.10 described as intermediate. On the other hand, the ICT competency of the teachers under the Pedagogical Domain and Professional Domain was described as Novice with overall means of 1.65 and 1.49, respectively. Results showed that the teacher factors were related to the perceived ICT competency of teachers, specifically age, educational attainment, length of service, number of years using computers, number of computer subjects, pre-service training, computer access of teachers in school, use of computer outside the school, e-mail address and web page of teachers. However, the ICT program of the school was not related to the perceived ICT competency of teachers.

Keywords: Information and Communication Technology, Competency; Concept, Social, Ethical Domain.

Introduction

The value of Information and Communication Technology (ICT) for teaching and learning has been a point of focus in education. The world has influx of new technologies almost every second. The technologies are always in the directions of making life easier and easier. Information spread faster through these advance technologies. Besides conveying information, technologies can also be used in various areas, particularly in education. If educators were to ignore the fact that technology can enhance their knowledge and teaching skills as well as upgrading students’ understanding lessons more easily than they are actually stepping backwards (Ahmad, 2008).

According to UNESCO (2001), the educational systems around the world are in a state of increasing pressure to use the new information and communication technologies (ICT) to teach students the knowledge and skills they need in the 21st century. Within the past decade, the new ICT tools have...
fundamentally changed the way people communicate and do business. These tools also have the potential to transform the nature of education: where and how learning takes place and the roles of students and teachers in the learning process.

ICT provides an array of powerful tools that may help in transforming the present isolated, teacher-centered and text-bound classrooms into rich, student-focused, interactive knowledge environments. To meet these challenges, learning institutions must embrace the new technologies and appropriate ICT tools for learning. They must also move towards the goal of transforming the traditional paradigm of learning (UNESCO, 2004).

One of the major efforts of the Philippine government to address the needs of ICT in education is the iSchools project of CICT. According to CICT (2005), the iSchools project is one of the flagship projects of Human Capital Development Group (HCDG). It supports the efforts of the Philippine government and the Department of Education to incorporate ICT in education in public high schools. CICT’s long-term goal is to contribute to the efforts of the Philippine government in bridging the digital divide by developing an Educational Digital Network that will equip all Public High School teachers and students with ICT literacy skills as well as provide them access to relevant digital content and applications in education that they can use to enhance effective learning.

In addition, Tan (2005) mentioned that the iSchools project of CICT seeks to support the efforts of the Department of Education to (1) ICT-enable all public high schools by 2010, (2) ensure that all high school graduates are ICT literate, and (3) improve the quality of high school education through the effective use of ICT in teaching and learning. It also focuses on strengthening classroom learning and instruction by expanding access to various sources of information.

Based on the above findings, this study is conceptualized to determine the ICT competency of teachers in the selected national high schools in the Congressional District-II of Nueva Ecija. As such, it is necessary to conduct an inquiry to find out the factors affecting the ICT competency of teachers in selected national high schools in the Congressional District-II of Nueva Ecija.

Methodology

This study used descriptive research method and applied the normative survey technique. This technique is suited to most correlation studies. Through this technique, the data on school and teachers were gathered, tabulated, analyzed and interpreted.

Respondents of the Study

Only the national high school in each town was used in the study as sample school in the Congressional District II of Nueva Ecija. The process of school selection was based on the number of students and teachers. The top four (4) schools out of the eight national high schools that have the biggest number of students and teachers in each town were selected as school samples. The schools were Constancio Padilla National High School in San Jose City, Doña Juana Chioco National High School in Lupao, Muñoz National High School in Science City of Muñoz, and Rizal National High School in Rizal, Nueva Ecija.

Theoretical and Conceptual Framework

This study was anchored on the Communal Constructivism of Holmes (2001), which is an expansion of social constructivism. The theory of communal constructivism influences the design of network learning strategies through application of information and communication technologies. Holmes (2001) essentially believes that Information Communication Technologies (ICT) is effective learning tools. In justifying the need for the theory of communal constructivism, Holmes et al. (2001) argue that the advent of new
technologies warrants a new kind of educational theory- communal constructivism. Communal constructivism as a learning theory therefore attempts to move beyond social constructivism and capture specific elements of the additional value that Information Communication Technologies (ICT) applications bring to the learning and teaching environment. It also supported the provision of learning environment with engaged classrooms, where both the teacher and students are not simply engaged in developing their own information but actively involved in creating knowledge that will benefit other students and teachers.

In joining the current trend in education today, which is the integration of ICT in the teaching and learning, teachers adapt the culture of using ICT-based instruction. In this culture, the role of teachers is not simply being traditional classroom teacher wherein they dominate the classroom discussion but teachers become facilitators of learning.

In the concept of teacher as facilitator of learning, teacher’s role changes from being “a sage on the stage” to becoming “a guide on the side”. The theory of communal constructivism encourages the teacher to become a facilitator of learning and the use of ICT is a big help to attain this goal. As the theory advocates the use of ICT in teaching and learning, it is also emphasized that in using ICT, the teacher’s competency in using ICT should be given importance to carry out the best application of ICT in the teaching and learning process.

Thus, it is conceptualized in this study that teacher factors in terms of socio-demographic profile of teachers such as sex, age, educational attainment, field of specialization, length of service, and teacher’s engagement on ICT such as on the use of computer and internet, course, training and seminar attended, and personal ICT equipment and the ICT program of the school in terms of program plan, personnel, budget, ICT facilities and equipment, and internet connection can influence the ICT competency of teachers. The conceptual framework (Figure 1) explains the paradigm, showing the dependent and independent variables.

**INDEPENDENT VARIABLES**

**Teacher Factors**

A. Socio-demographic Profile
- Sex
- Age
- Educational Attainment
- Field of Specialization
- Length of Service

B. Teacher’s Engagement on ICT
- On the Use of Computer and Internet
- Course, Training and Seminar Attended
- Personal ICT Equipment

**ICT Program of the School**
- Program Plan
- Personnel
- Budget
- ICT Facilities and Equipment
- Internet Connection

**DEPENDENT VARIABLE**

Perceived ICT Competency of Public High School Teachers in four ICT Domains

1. Technology Operations and Concepts Domain
2. Social and Ethical Domain
3. Pedagogical Domain
4. Professional Domain

Figure 1. A conceptual paradigm showing the relationship between the independent and dependent variable
Sampling Procedure

This study used random sampling procedure to identify the teacher-respondents out of the 356 total permanent teachers of the selected national high schools. To determine the sample size of the study, the Slovin’s sampling formula below was used (Sevilla, 1984).

\[ n = \frac{N}{1 + Ne^2} \]

Where:
- \( n \) = a total sample size for the study
- \( N \) = population size
- \( e \) = desired level of significance

As a result of the above formula, the following distribution was made: 50 or 38.17 percent teacher-respondents came from Constancio Padilla National High, 48 or 36.64 percent teacher-respondents from Muñoz National High School, 18 or 13.74 percent teacher-respondents from Rizal National High School and 15 or 11.45 percent teacher-respondents from Doña Juana Chioco National High School.

<table>
<thead>
<tr>
<th>NAME OF SCHOOL</th>
<th>TEACHERS’ POPULATION</th>
<th>SAMPLE</th>
<th>PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPNHS</td>
<td>Constancio Padilla National High School</td>
<td>135</td>
<td>50</td>
</tr>
<tr>
<td>DJCNHS</td>
<td>Doña Juana Chioco National High School</td>
<td>42</td>
<td>15</td>
</tr>
<tr>
<td>MNHS</td>
<td>Muñoz National High School</td>
<td>130</td>
<td>48</td>
</tr>
<tr>
<td>RNHS</td>
<td>Rizal National High School</td>
<td>49</td>
<td>18</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>356</td>
<td>131</td>
</tr>
</tbody>
</table>

Literature

Teacher’s Engagement on ICT

Computer Accessibility in School and Use of Computer Outside the School.

There is an assumption that even if teachers get an appropriate training in ICT in education, those who have regular access to the technology are the ones more open and motivated to explore and experiment with it than those who do not (ICT, 2005). Several research studies indicate that lack of access to resources, including home access, is another complex barrier that discourages teachers from integrating new technologies into education.

Various research studies indicated several reasons for the lack of access to technologies that have taken place. Sicilia (2005) revealed that teachers complained about how difficult it was to always have access to computers, she gave reasons like “computers had to be booked in advance and the teachers would forget to do so, or they or they could not book them for several periods in a row when they wanted to work on several projects with the students. In other words, a teacher had no access to ICT materials because most of these were shared with other teachers.

Additionally, inaccessibility of ICT resources is not always merely due to the non-availability of the hardware and software or other ICT materials within the school. It maybe the result of one of the number of
factors such as poor organization of resources, poor quality hardware, inappropriate software, or lack of personal access for teachers (BECTA, 2004).

In addition, Espino (2008), teachers with more experience about computers even outside the school hours become more confident with the ICT use and can develop more skills that help to improve ICT competencies of the teacher.

Furthermore, in the study conducted by InfoDev (2008), as cited by Espino (2008), stated that teachers with more exposure to computers even outside the school hours become more confident with ICT use and can develop more skills.

**ICT Competency of Teachers**

**Technology Operations and Concepts**

Technology Operations and Concepts measured the competency of teachers in demonstrating knowledge and skills in basic computer operation and other information devices including basic troubleshooting and maintenance; use appropriate office and teaching productivity tools; understand and effectively use the Internet and network applications and resources; and demonstrate knowledge and skills in information and data management (CICT, 2005).

**Social and Ethical Domain**

The Social and Ethical Domain measured the competency of teacher-respondents to understand and observe legal practices in the use of technology; recognize and practice ethical use of technology in both personal and professional levels; plan, model and promote a safe and sound technology supported learning environment; and facilitating equitable access to technology that addresses learning, social and cultural diversity (CICT, 2005).

**Pedagogical Domain**

The Pedagogical Domain is concerned with the competency of teacher-respondents to apply technology to develop students’ higher order thinking skills and creativity; provide performance tasks that require students to locate and analyze information and to use a variety of media to clearly communicate results; conduct open and flexible learning environments where technology is used to support a variety of interactions among students, cooperative learning and peer instruction; evaluate use of ICT integration in the teaching-learning process and use results to refine the design of learning activities; use computers and other technologies to collect and communicate information to students’ colleagues, parents, and others; and apply technology to facilitate a variety of appropriate assessment and evaluation strategies recognizing the diversity of learners (CICT, 2005).

**Professional Domain**

Professional Domain measured the competency of teacher-respondents to pro-actively engage in exploring and learning new and emerging technologies; continuously evaluate and reflect on the use of technology in the profession for development and innovation; and share experiences and expertise, and collaborate with peers and stakeholders in advancing the use of technology in education and beyond (CICT, 2005).

**The iSchools Project of CICT**

The iSchools project is one of the flagship projects of Human Capital Development Group (HCDG). It supports the efforts of the Philippine Government and the Department of Education to incorporate ICT in
education in public high schools. Its long-term goal is to contribute to the efforts of the Philippine
government in bridging the digital divide by developing an Educational Digital Network that will equip all
public high school teachers and students with ICT literacy skills as well as provide them access to relevant
digital content and applications in education that they can use to enhance effective learning (CICT, 2005).

The Smart Schools Program

The Smart Schools Program (SSP) is a community service initiative of Smart Communications Inc. that
promotes Information and Communications Technology (ICT) in basic education through partnerships
with public schools, its officials and parents-teachers-community associations (PTCAs). Specifically, SSP aims
to provide public school teachers with Internet access through the PLDT group's wide range of
communications solutions, access to online content and teacher training on ICT. (Smart Schools Program,
2004).

The Importance of ICT in Education

Several Studies argue that new technologies in the classroom are essential for providing opportunities for
students to learn to operate in an information age. It is evident, as Yelland (2001) argued that traditional
educational environments do not seem suitable for preparing learners to function or to be productive in
workplaces in today's society. She claimed that organizations that do not incorporate the use of new
technologies in schools cannot seriously claim that they prepare their students for life in the 21st century.

Discussion

ICT Competency of Teachers

Table 2 shows the summary of means of the ICT competency of teacher-respondents. The table indicates
that the overall mean of the ICT competency of teacher-respondents was 1.84 with a descriptive equivalent
of “Intermediate”. This means that the teacher-respondents have an average knowledge and skills in the use
of ICT in education.

Specifically, table 8 shows that the two domains with the highest mean were Technology Operations and
Concepts and Social and Ethical Domain with the same mean of 2.10. The result implies that the teacher-
respondents have an intermediate knowledge and skills in this two particular domain.

It also implies that the teacher-respondents have limited knowledge and skills in the Pedagogical and
Professional Domain considering the description of these two domains which is “novice” or respondents
were just beginners in these particular domains.

On the other hand, the two domains with the lowest mean were on Pedagogical Domain and Professional
Domain with a mean of 1.65 and 1.49, respectively. It implies that the teacher-respondents have limited
knowledge and skills in the Pedagogical and Professional Domain considering the description of these two
domains which is “novice” or respondents were just beginners in these particular domains.

The result only implies that teacher-respondents are in need of relevant training in the use of ICT for them
to develop their competency in the use of it. Trainings should not only be concerned in developing their
knowledge and skills in the basic use of computers but also in other domains particularly in pedagogical
and professional domains which the data reveal that this was the lowest domain among the four domains
that measured the ICT competency of teachers.
Table 2. Summary of Means and Description of ICT Competency of teacher-respondents by domain

<table>
<thead>
<tr>
<th>DOMAIN</th>
<th>MEAN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Technology Operations and Concepts</td>
<td>2.10</td>
<td>Intermediate</td>
</tr>
<tr>
<td>B. Social and Ethical</td>
<td>2.10</td>
<td>Intermediate</td>
</tr>
<tr>
<td>C. Pedagogical</td>
<td>1.65</td>
<td>Novice</td>
</tr>
<tr>
<td>D. Professional</td>
<td>1.49</td>
<td>Novice</td>
</tr>
<tr>
<td>Over All Mean</td>
<td>1.84</td>
<td>Intermediate</td>
</tr>
</tbody>
</table>

Legend:

- Scale Descriptive Equivalent
  - 1.0 – 1.75 = NOVICE
  - 1.76 – 2.50 = INTERMEDIATE
  - 2.51 – 3.25 = ADVANCED
  - 3.26 – 4.00 = SUPERIOR

The survey of ICT utilization in Philippine public high schools stated that 92 percent of the respondents need more information on how to use ICT to support the curriculum. While 96 percent of the respondents need to develop skills on hands on activities to be shared with their students (Tinio, 2002).

Furthermore, the issue of training is certainly complex because it is important to consider several components to ensure the effectiveness of training. These were time of training, pedagogical training, skills training, and an ICT use in initial teacher training (BECTA, 2004).

Furthermore, it was supported in BECTA’s survey (2004) that providing pedagogical training for teachers, rather than simply training them to use ICT tools, is an important issue. In addition, Cox (1999) argued that if teachers were to be convinced of the value of using ICT in their teaching, their training should focus on the pedagogical issue.

Moreover, the results of the research by Cox (1999) showed that after teachers had attended professional development courses in ICT, teachers still did not know how to use ICT in their classrooms; instead they just know how to run a computer and set up the printer. He explained that this is because the courses only focused on teachers acquisition of basic ICT skills and did not often teach teachers how to develop the pedagogical aspects of ICT. On the other hand, Balanskat et al. (2006) indicated that inappropriate teacher training is not helping teachers in the use of ICT in their classrooms and in preparing lessons. They assert that this is because training programs do not focus on teachers’ pedagogical practices in relation to ICT but on the development of ICT skills.

However, according to the BECTA’s survey (2004), besides the need of pedagogical training, it is still necessary to train teachers in specific ICT skills. Schoepp (2005) claims that when new technologies need to be integrated in the classroom, teachers need to be trained in these particular ICTs. According to Newhouse (2002), as cited by Bingimlas (2009), some initial training is needed for teachers to develop appropriate skills, knowledge, and attitudes regarding the use of computers to support learning by their students. He argued this is also requires continuing provision of professional development to maintain appropriate skills and knowledge. Also, Bingamlas (2009) mentioned that “teachers need not only be computer literate but they also need to develop skills integrating computer use into their teaching/learning programmes”.

Relationship between Teacher Factors and ICT Competency of Teachers

Pearson Product-Moment Coefficient Correlation (r) was used to determine the relationship between teacher factors and ICT competency of teacher-respondents. Table 9 shows the relationship between teacher factors and ICT competency of teachers-respondents.
Results showed that there was a significant relationship between the teacher factors in terms of socio-demographic profile of teachers such as age, educational attainment, length of service, and teachers’ engagement on ICT such as number of years in using computer, number of computer subjects, computer access of teachers in school, use of computer outside the school, having e-mail address, maintaining webpage, and pre-service training of teachers with the ICT competency of teacher-respondents. Hence, the null hypothesis “there is no significant relationship between the teacher factors and ICT competency of teachers” is rejected. It means that the teacher factors affect the ICT competency of the teacher-respondents.

Table 3. Relationship between the teacher factors and ICT competency of teachers

<table>
<thead>
<tr>
<th>CHARACTERISTICS</th>
<th>TECHNOLOGY OPERATIONS AND CONCEPTS</th>
<th>SOCIAL AND ETHICAL DOMAIN</th>
<th>PEDAGOGICAL DOMAIN</th>
<th>PROFESSIONAL DOMAIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Socio-demographic Profile</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>-0.1606 ns</td>
<td>-0.1069 ns</td>
<td>-0.0782 ns</td>
<td>0.0175 ns</td>
</tr>
<tr>
<td>Age</td>
<td>-0.5762**</td>
<td>-0.5441**</td>
<td>-0.3420**</td>
<td>-0.2210*</td>
</tr>
<tr>
<td>Educational Attainment</td>
<td>-0.1369 ns</td>
<td>-0.1904*</td>
<td>-0.1736*</td>
<td>-0.1686 ns</td>
</tr>
<tr>
<td>Field of Specialization</td>
<td>-0.1531 ns</td>
<td>-0.1724 ns</td>
<td>-0.1433 ns</td>
<td>-0.1439 ns</td>
</tr>
<tr>
<td>Length of Service</td>
<td>-0.5270**</td>
<td>-0.5221**</td>
<td>-0.3208**</td>
<td>-0.2182*</td>
</tr>
<tr>
<td>B. Teacher’s Engagement on ICT</td>
<td>On the use of Computer and Internet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Years in Using Computer</td>
<td>0.4295**</td>
<td>0.3055**</td>
<td>0.2610**</td>
<td>0.0023 ns</td>
</tr>
<tr>
<td>Computer Access of Teachers in School</td>
<td>0.2300**</td>
<td>0.1269 ns</td>
<td>0.1761*</td>
<td>0.0263 ns</td>
</tr>
<tr>
<td>Use of Computer Outside School</td>
<td>0.3733**</td>
<td>0.2039*</td>
<td>0.0887 ns</td>
<td>0.0502 ns</td>
</tr>
<tr>
<td>E-mail Address</td>
<td>0.4094**</td>
<td>0.1374 ns</td>
<td>0.1723*</td>
<td>0.1116 ns</td>
</tr>
<tr>
<td>Web Page</td>
<td>0.2325**</td>
<td>0.2922**</td>
<td>0.1864*</td>
<td>0.1974*</td>
</tr>
<tr>
<td>Course, Training, and Seminar Attended</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Computer Subject during BS degree</td>
<td>0.3323**</td>
<td>0.3671**</td>
<td>0.2685**</td>
<td>0.2414**</td>
</tr>
<tr>
<td>Pre-service Training</td>
<td>0.3108**</td>
<td>0.2281**</td>
<td>0.2685**</td>
<td>0.2693**</td>
</tr>
<tr>
<td>In-Service Training</td>
<td>0.1346 ns</td>
<td>0.1580 ns</td>
<td>0.0947 ns</td>
<td>0.0331 ns</td>
</tr>
<tr>
<td>Personal ICT Equipment</td>
<td>0.1433 ns</td>
<td>0.1380 ns</td>
<td>0.1358 ns</td>
<td>0.1248 ns</td>
</tr>
</tbody>
</table>

Legend:
* Correlation is significant at 0.05 level
** Correlation is highly significant at 0.01 level
ns Correlation is not significant at neither 0.01 or 0.05 level

A. Socio-Demographic Profile

Technology operations and concepts (r= -0.5762), social and ethical domain (r= -0.5411), and pedagogical domain (r= -0.3420) were found to be negatively highly correlated with the age of the teacher-respondents. The professional domain was found to be significantly correlated (r= -0.2210) with the age of the teacher-respondents.
It implies that the younger the teacher is, the better is his/her ICT competency. The result revealed that young teachers have better ICT competency compared to older teachers. This is may be due to more exposure of young teachers to different technologies today as well as ICT is included in their curriculum. They have Computer Science and Educational Technology subjects. These subjects may help in the development of the ICT competency of education students to prepare them in the use of ICT in the teaching and learning process.

Similar findings were revealed in the study conducted by the Department of Education in Western Australia (2008). It was found out that ICT competence scores decrease as teacher’s age increases.

Furthermore, Ramayan et al. (2003) as cited by Boonsawang (2007), found that age was negatively related to internet and computer usage where younger teachers were more likely to use these facilities. The educational attainment of teacher-respondents was found to be negatively related with the ICT competency of teachers in terms of Social and Ethical Domain ($r$ = -0.1904) and Pedagogical Domain ($r$ = -0.1736). It means that the higher the educational attainment of the teacher-respondents, the lower their ICT competency specifically in Social and Ethical Domain and Pedagogical Domain.

Results revealed that the teacher-respondents that have lower educational attainment have higher knowledge and skills in Social and Ethical Domain and Pedagogical Domain. This may be due to the fact that since most of the teachers with higher educational attainment were older teachers, the tendency of their ICT competency was also low. They lacked pre-service training in using ICT and lack of exposure to the new technologies because most of older teachers did not use computer, internet and other ICT equipment.

The teachers’ length of service showed a negatively highly correlated ($r$ = -0.5762) in Technology Operation and Concepts Domain, Social and Ethical Domain ($r$ = -0.05221), and Pedagogical Domain ($r$ = 0.3208). The Professional Domain was also found negatively correlated ($r$ = -0.02182) to the length of service of teacher-respondents.

It only implies that the longer the length of service of the teacher-respondents the lower their ICT competency. This is no doubt because of the relationship of length of service and age of the teacher-respondents.

Similar findings were found by the Department of Education in Western Australia (2008), that the ICT competence scores decreases as the duration of a teacher teaching in a government school increases. In addition, Mandac (1989), as cited by Cruz (2007), claimed that the length of service changes individuals. A teacher with longer service in teaching has rich accumulated experience in the curriculum he/she handles.

B. Teacher’s Engagement on ICT
On the use of Computer and Internet

Teachers’ number of years in using computer is highly significantly correlated with the Technology Operations and Concepts ($r$ = 0.4295) and Social and Ethical Domain ($r$ = 0.3055). This finding implies that the longer the years that the teacher-respondents use computer, the higher their ICT competency particularly in Technology Operations and Concepts Domain and Social and Ethical Domain.

It is revealed that the number of years of using computer developed the knowledge and skills of the teacher-respondents in the basic technology operations and concepts since they actually computer and this really helps develop their ICT competency. They also become familiar with their social and ethical obligations as ICT users especially to their students in inculcating in them how to become a responsible ICT user. The number of computer subjects of teacher-respondents in their bachelors’ degrees was found highly correlated with the Technology operations and Concepts Domain ($r$ = 0.3323), Social and Ethical Domain ($r$ = 0.3671), pedagogical Domain ($r$ = 0.2685), and Professional Domain ($r$ = 0.2414). It means that the more the number of computer subjects of teacher-respondents in their bachelors’ degrees, the higher their ICT competency.
The computer access of teachers in school was found to be highly significant in relation to the Technology Operations and Concepts Domain ($r=0.2300$) and significantly related to Pedagogical Domain ($r=0.1761$). This finding reveals that computer access of teacher–respondents outside the school affects their ICT competency particularly in Technology Operations and Concepts Domain and Pedagogical Domain. It means that giving chance for teachers to have access to computer in school has also given them a chance to practice and gain knowledge and skills in using computer that may result in the enhancement of their ICT competency.

The teacher-respondents’ use of computer outside school hours was found to be highly significant in relation to the Technology Operations and Concepts Domain ($r=0.3733$) and significantly related to the Social and Ethical Domain ($r=0.2039$). It implies that the interest of teachers in using computers outside the schools really helps in the development of their ICT competency particularly in Technology Operations and Concepts Domain and Social and Ethical Domain.

Results revealed the importance of using computer not only during schools hours but also outside the school to enhance the knowledge and skills of teacher-respondents in the use of ICT. Having e-mail address was shown to be highly significantly correlated with the Technology Operations and Concepts Domain ($r=0.4094$). It implies that using e-mail can help develop the ICT competency of teacher-respondents particularly in Technology Operations and Concepts Domain. By means of using e-mail on the part of the teachers, they are able to practice their skills and knowledge concerning Technology Operations and Concepts Domain which is a prerequisite to be able to do their e-mail.

Maintaining web page as teaching tool was found to be highly significantly correlated with the Technology Operations and Concepts Domain ($r=0.2325$), Social and Ethical Domain ($r=0.2922$), and Pedagogical Domain ($0.1864$), while the Professional Domain was found to be significantly correlated ($0.1974$). It implies that maintaining web page will enhance the ICT competency of teachers. It further implies that if the teacher-respondents were able to maintain their web page it means that they have high ICT competency which is required in making and maintaining web page.

The result reveals that to be able to maintain web page as a teaching tool it requires that teachers have the needed knowledge and skills in the Technology Operations and Concepts Domain, Social and Ethical Domain, Pedagogical Domain, and Professional Domain, like knowledge and skills regarding the manipulation or use of computer and internet and being responsible users of internet by knowing their limitations and responsibilities in using this kind of technology in imparting knowledge to their students and other people who will use their web page.

Aside from careful planning about the content of the web page, there is also need a to ensure that the web page will cater to the needs of the students that surely help in the teaching and learning process, and lastly, showing willingness to engage in researches about ICT and using the technology for the purpose of innovation and the unselfishly sharing whatever available materials and expertise that he/she can share to his/her colleagues and other people by posting it to his/her web page.

Course, Training and Seminar Attended

The teachers’ pre-service training showed highly significant correlation to all domains. Technology Operations and Concepts ($r=0.3108$), Social and Ethical Domain ($r=0.2281$), Pedagogical Domain ($r=0.2685$), and Professional Domain ($r=0.2693$). Finding implies that the pre-service training of teachers is very significant in preparing future teachers in the use of ICT in their work as a teacher. It only implies that the number of ICT subjects of teacher-respondents in their Bachelor’s degrees greatly affect their ICT competency. The training and knowledge that they gain in their ICT subject in their BS degrees dictate how competent they are in using ICT.
According to the BECTA’s survey (2004), “pre-service teachers lack practical models of integration, leading to disparity between their expectations of ICT use and their actual use. This lack of encouragement to use ICT during teaching practice and other factors which have more to do with schools prevent new teachers integration in class and they lack motivation to do so”.

Education and training have a major role to play in the implementation of the ICT policies in the national level. The success in the use of ICT in all sectors will require sufficient and competent human resource that is well developed and equipped in the education and training sectors. The successful introduction and use of ICT in education and training institutions will play major roles in disseminating skills to wider sectors of society (Omwenga 2007).

Findings also revealed that some of the teacher factors such as sex, field of specialization, in-service training, and personal ICT equipment were found to be not significant in the ICT competency of teachers.

**Relationship between ICT Programs of the School and the Perceived ICT Competency of High School Teachers in Four ICT Domains**

To find out the relationship between ICT program of the school and the perceived ICT competency of teachers in selected national high schools in the Congressional District-II of Nueva Ecija, the ICT programs of the school were correlated with the perceived ICT competency of teachers.

Table 4 shows the relationship between ICT program of the school and the perceived ICT competency of teachers in terms of Technology Operations and Concepts Domain, Social and Ethical Domain, Pedagogical Domain, and Professional Domain.

<table>
<thead>
<tr>
<th>CHARACTERISTICS</th>
<th>TECHNOLOGY OPERATIONS AND CONCEPTS</th>
<th>SOCIAL AND ETHICAL DOMAIN</th>
<th>PEDAGOGICAL DOMAIN</th>
<th>PROFESSIONAL DOMAIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Program Plan</td>
<td>0.1246 ns</td>
<td>0.1488 ns</td>
<td>0.5930 ns</td>
<td>-0.9550 ns</td>
</tr>
<tr>
<td>B. Personnel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of School</td>
<td>-0.1079 ns</td>
<td>-0.1093 ns</td>
<td>-0.0847 ns</td>
<td>-0.0178 ns</td>
</tr>
<tr>
<td>Personnel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICT Teacher</td>
<td>0.0025 ns</td>
<td>-0.0319 ns</td>
<td>0.0425 ns</td>
<td>0.1251 ns</td>
</tr>
<tr>
<td>ICT Technician</td>
<td>-0.1486 ns</td>
<td>0.0050 ns</td>
<td>-0.1016 ns</td>
<td>-0.0115 ns</td>
</tr>
<tr>
<td>C. Facilities and Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Availability of ICT</td>
<td>-0.1135 ns</td>
<td>-0.1102 ns</td>
<td>-0.1344 ns</td>
<td>0.0054 ns</td>
</tr>
<tr>
<td>Facilities and Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Internet Connection</td>
<td>-0.1350 ns</td>
<td>0.0354 ns</td>
<td>-0.0685 ns</td>
<td>0.0527 ns</td>
</tr>
</tbody>
</table>

Legend:

*ns* Correlation is not significant at neither 0.01 or 0.05 level

Pearson Product-Moment Coefficient Correlation (r) was used to find out the relationship of the ICT program of the school and the ICT competency of teachers.

As shown in table10, data reveal that the ICT program of the school in terms of program plan, personnel which includes total number of personnel, ICT teacher, and ICT technician, availability of ICT facilities and equipment, and internet connection have no significant relationship in the ICT competency of teachers. The result revealed that the ICT program of the school does not affect the perceived ICT competency of teachers.
Thus, the null hypothesis that the ICT program of the school does not significantly relate to the ICT competency of teachers in the selected national high schools in the Congressional District II is accepted.

Problems Encountered by Teachers-Respondents and the School in the Use of ICT

Nowadays, it is common to hear that instructional technology is the key to educational quality in the new millennium (Fiske and Homand, 1997 as cited by Pimnoo, 2009). But making this into reality is a big challenge in our educational Institutions today considering the many problems encountered by the teachers and schools in using ICT in school.

Table 5 shows problems encountered by the teacher-respondents and the school in the use of ICT in their respective schools.

Table 5. Problems encountered by teacher-respondents and the school in the use of ICT

<table>
<thead>
<tr>
<th>PROBLEMS *</th>
<th>F</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Insufficient ratio of computer units to student population.</td>
<td>108</td>
<td>82.44</td>
</tr>
<tr>
<td>2. Lack/insufficient relevant training opportunities for teachers.</td>
<td>83</td>
<td>63.36</td>
</tr>
<tr>
<td>3. Lack of funds to purchase additional computer units and other</td>
<td>82</td>
<td>62.60</td>
</tr>
<tr>
<td>ICT equipment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Insufficient time for teachers in preparing ICT-based lessons.</td>
<td>77</td>
<td>58.78</td>
</tr>
<tr>
<td>5. Teacher’s incompetency in using computers and internet for instructional purposes.</td>
<td>76</td>
<td>58.02</td>
</tr>
<tr>
<td>6. Unfamiliar operating systems to majority of students and teacher.</td>
<td>59</td>
<td>45.04</td>
</tr>
<tr>
<td>7. Absence of technical assistance in operating and maintaining ICT equipment.</td>
<td>54</td>
<td>41.22</td>
</tr>
<tr>
<td>8. Lack of internet service providers in the area.</td>
<td>49</td>
<td>37.40</td>
</tr>
<tr>
<td>9. Failure to integrate ICT in core subjects.</td>
<td>44</td>
<td>33.59</td>
</tr>
<tr>
<td>10. Lack of skills among students in handling computers.</td>
<td>39</td>
<td>29.77</td>
</tr>
<tr>
<td>11. Lack of interest/willingness among the teachers to use ICT.</td>
<td>34</td>
<td>25.95</td>
</tr>
<tr>
<td>12. Teachers feel uncomfortable in using ICT because some students are more competent than them.</td>
<td>33</td>
<td>25.19</td>
</tr>
<tr>
<td>13. Inadequate administrators support or initiative at the school/division/regional level.</td>
<td>31</td>
<td>23.66</td>
</tr>
<tr>
<td>14. Insufficient funds to pay electricity bills.</td>
<td>22</td>
<td>16.79</td>
</tr>
<tr>
<td>15. Too complicated software for teachers and students use.</td>
<td>18</td>
<td>13.74</td>
</tr>
</tbody>
</table>

*Multiple responses

As shown in the table 5, the number one problem identified by most (108 or 82.44%) of the teacher-respondents was the “Insufficient ratio of computer units to student population”. It was followed by “Lack/insufficient relevant training opportunities for teachers” (83 or 63.36%); “Lack of funds to purchase additional computer units for and students and teacher” (59 or 45.04%); “Absence of technical assistance in operating and maintaining ICT equipment” (54 or 41.22%); “Lack of internet service providers in the area” (49 or 37.40%); “Failure to integrate ICT in core subjects” (44 or 33.59%); and “Lack of skills among students in handling computers” (39 or 29.77%). These were the top ten problems identified by the teacher-respondents in using ICT.

The result implies that there are still lots of problems to be addressed by the Department of Education for the success of their efforts in the improvement of using ICT in education and also for the improvement of competency of both teachers and students.
Summary

ICT Competency of Teachers

The overall results of the ICT competency of teachers was “Intermediate” with an overall mean of 1.84. Specifically, Technology Operations and Concepts Domain with an overall mean of 2.10 with a description of “Intermediate”; Social and Ethical Domain with an overall mean of 2.10 with a description of “Intermediate” Pedagogical Domain with an overall mean of 1.65 with a description of “Novice”; and Professional Domain with an overall mean of 1.49 with a description of “Novice”.

Relationship between Teacher Factors and the Perceived ICT Competency of Teachers

There were significant relationships between the teacher factors like age, educational attainment, length of service, number of years using computers, number of computer subjects, computer access of teachers in school, use of computer outside the school, e-mail address and web page, and pre-service training of teachers with the ICT competency of teacher-respondents.

The professional domain was found to be significantly correlated \( r = -0.2210 \) with the age of teacher-respondents. Also, technology operations and concepts \( r = -0.5762 \), social and ethical domain \( r = -0.5411 \), and pedagogical domain \( r = -0.3420 \) were found to be negative highly correlated with the age of the teacher-respondents.

The educational attainment of teacher-respondents was found to be negatively related with the ICT competency of teachers in terms of Social and Ethical Domain \( r = -0.1904 \) and Pedagogical Domain \( r = -0.1736 \).

The teachers’ length of service showed a highly negative correlation coefficient \( r = -0.5762 \) with Technology Operations and Concepts Domain, Social and Ethical Domain \( r = -0.05221 \), and Pedagogical Domain \( r = 0.3208 \). The Professional Domain was also found negatively correlated \( r = -0.02182 \) to the length of service of teacher-respondents.

Teachers’ number of years in using computer indicates a significant highly correlation with the Technology Operations and Concepts \( r = 0.4295 \) and Social and Ethical Domain \( r = 0.3055 \). The computer access of teachers in school was found to be highly significant in relation to Technology Operations and Concepts Domain \( r = 0.2300 \) and significantly related to Pedagogical Domain \( r = 0.1761 \).

The teacher-respondents use of computer outside school hours was found to be highly significant in relation to the Technology Operations and Concepts Domain \( r = 0.3733 \) and significantly related to the Social and Ethical Domain \( r = 0.2039 \).

Having e-mail address was showed highly significantly correlated with the Technology Operations and Concepts Domain \( r = 0.4094 \). Maintaining Web page as teaching tool was found to be highly significantly correlated with the Technology Operations and Concepts Domain \( r = 0.2325 \), Social and Ethical Domain \( r = 0.2922 \), and Pedagogical Domain \( r = 0.1864 \) while the Professional domain was found to be significantly correlated \( r = 0.1974 \).

The number of computer subjects of teacher-respondents during their bachelors’ degrees was found highly correlated with the Technology operations and Concepts Domain \( r = 0.3323 \), Social and Ethical Domain \( r = 0.3671 \), pedagogical Domain \( r = 0.2685 \), and Professional Domain \( r = 0.2414 \). The teachers’ pre-service training showed highly significant correlation to all domains. Technology Operations and Concepts \( r = 0.3108 \), Social and Ethical Domain \( r = 0.2281 \), Pedagogical Domain \( r = 0.2685 \), and Professional Domain \( r = 0.2693 \).
Relationship between ICT Program of the School and the Perceived ICT Competency of Teachers

There was no significant relationship between the ICT program of the school in terms of program plan, personnel, budget, facilities and equipment and internet connection and the perceived ICT competency of teachers.

Conclusions

Based on the results of the study, the following conclusions were drawn:

1. Teacher-respondents were mostly females, young teachers with a mean age of 36.20 years old. Majority of teacher-respondents were BS degree holders with MA/MS units and science related majors. Most of them were also new in the service with a mean length of service of 11.3 years. Majority of teacher-respondents were computer users and had only one computer subject in their BS degrees. They lacked pre-service training and in-service training related to ICT. Most of them attended ICT related training for their personal growth, career enhancement and to facilitate learning. Most the teacher-respondents have their personal ICT equipment that is why majority of them were computer literate.

2. Majority of the school respondents have no program plan for the ICT program of the school, no ICT technician who will maintain the ICT equipment of the school. There is also no specific budget to support the ICT program of the school. Most of the teachers lacked in-service training because only few of them were sent by the school to attend ICT trainings. Most of the schools had ICT equipment and internet connection but were not enough for the use of both students and teachers.

3. The overall competency of teachers was “Intermediate” which means that they only have average knowledge and skills in the use of ICT. The teachers’ competency on the Technology Operations and Concepts and Social and Ethical Domain was described to be “Intermediate”. On the other hand, the teachers’ competency on the Pedagogical Domain and Professional Domain was described as “Novice”.

4. The teacher factors were significantly related to the perceived ICT competency of teachers; specifically, the teacher’s age, educational attainment, length of service, number of years using computers, number of computer subjects, pre-service training, computer access of teachers in school, use of computer outside the school, having e-mail address and maintaining web page as teaching tool.

5. The ICT program of the school was not related to the perceived ICT competency of teachers.

6. The top major problems encountered by teachers and schools in the use of ICT in the teaching and learning activities were insufficient in ratio vis-a-vis computer units to student population, lack/insufficient relevant training opportunities for teachers, lack of funds to purchase additional computer units and other ICT equipment, insufficient time for teachers in preparing ICT-based lessons, and teacher’s incompetency in using computers and internet.

References


