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Information Communication Technology in Manuel A. Roxas High School

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Abstract

The study sought to determine the status of Information Communication Technology Instruction in Public Secondary Schools in the City of San Carlos, Pangasinan during the school year 2025 – 2026 in terms of teachers' profile, availability of hardware and software technologies, level of technology competencies in nine (9) domains of ICT strengths and needs of teachers in teaching ICT and the problems encountered. The respondents consisted of 64 TLE teachers teaching ICT in the Ramon Magsaysay National High School, Manila.

The salient findings of the study are as follows: Most of the teachers are within the age bracket from 22-39 years, do not have background in ICT, have attended seminars/training for 3-4 times for the last 2 years are been in the service for 8 years or more; Only computer and television are available under hardware technologies and computer programs and telecasts/telecine under software technologies are fully available to all the 15 school; The level of teachers' technology competencies in the domains of Basic Computer Operation Skills, Word Processing, Spread sheets are describe as "Competent". The other ICT domains namely: Setup, Maintenance and Troubleshooting of Equipment, Database, Networking, Telecommunication, Media Communication and Social, Legal and Ethical Issues are describe as "Somewhat Competent"; With the exception of educational attainment related to ICT, no significant differences between teachers' technology competencies and age, length of service and attendance in seminars/training were found to exist; There are strengths and needs of teachers along the nine (9) domains of ICT. In some areas, there are more needs than strengths; The most serious problems encountered by teachers are lack of funds in the provision of technologies, lack of "know-how" in the use of the different technologies and lack of training in the preparation, maintenance and troubleshooting of equipment and A proposed plan of action to improve the level of technology competencies of teachers can be formulated.

Keywords: *ICT instruction, technology competencies, public secondary schools, teacher profile, hardware availability, software availability, basic computer skills, word processing, spreadsheets, educational technology*

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I. THE PROBLEM

Rationale

The world we live in today is very different from what it was a century, even a few decades ago. This transformation has been driven in part by rapid technology innovation. While the 19th century saw the rise of the Industrial Revolution, with steam-powered machines intensifying and expanding human productive power, the 20th century was characterized by the birth of machine-powered flight and the emergence of broadcasting and computer technologies that extended the reach of human creativity even more and made possible new ways by which humans could live and work together.

Educational institutions acknowledge that they must move space with the technology-driven changes in society and economy. In today's knowledge society, schools must ensure that learners possess the competencies to wield these new information and communication tools productively, they must equip learners with the critical and analytic tools necessary to live and flourish in an information-saturated environment. Mastery of facts has become less important than the ability to contextualize these facts and derive their meaning within specific contexts. Thus, learners must develop three foundational skills: 1) how to find information; 2) how to determine if what is found is relevant to the task at hand; 3) how to determine if the relevant information is accurate (Thornburg, 2004). Further, according to him, acquisition of these three foundational skills sets the parameters for the use of ICT in schools. ICT is an acronym that stands for Information and Communication Technology. ICT is the integration of information processing, computing and communication technologies. ICT is changing the way we learn, work and live in society and is often spoken of in a particular context, such as in education, health care, or liabilities. A good way to think about ICT is to consider all the uses of digital technology that already exist to help individuals, businesses and organizations use information. ICT covers any product that will store, retrieve, manipulate, transmit or receive information electronically in a digital form and is concerned with these products. Importantly, it is also concerned with the way these different uses can work with each other. The tools that in part crated the demand for information literacy skills in the first place can, if used effectively, be the best tools to help learners meet these demands. The integration of ICT in the teaching and learning process is, potentially, one of the most viable interventions towards educational reform. The models of effective ICT use, however, cannot be constructed overnight. A variety of technological, curricular, pedagogical, institutional, cultural and financial issues to be addressed, and the complex interaction among these various factors means that constructing the best practice models would involve much "thought, experimentation, and a willingness to spend the time to develop and refine strategies until they are proven to be effective" (DepEd Order No. 76, s. 2010).

The Department of Education began a process of curriculum restructuring aimed at improving the quality of Filipino learners and providing restructuring aimed at improving the quality of Filipino learners and providing them the necessary skills for lifelong learning. The resulting 2002 Basic Education Curriculum (BEC) is being implemented nationwide beginning June 2002. Among the new curriculum's notable features is the reorganization of subjects into five learning areas, namely: Filipino, English, Science, Mathematics and Makabayan. The latter integrates previously separate subjects such as Social Studies, Physical Education, Health and Music, and Technology and Home Economics. Values Education, on the other hand, will be

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integrated in all learning areas.

The demands of the modern society represent a unique opportunity for education systems. Schools that traditionally have taught students to store and recall information from specific content areas must now respond to the challenge of preparing young people for integration and success in societies and economics driven by the transformation of knowledge into new ideas and applications.

Classrooms must serve as places of collaboration and discovery where information and communication technologies (ICTs) can be integrated into the learning process. Technology can also be used to facilitate the acquisition of more general skills such as critical thinking, communication, and life-long learning. New technologies are tools that can be used to improve most areas of education.

Information and communication technologies are of paramount importance to the future of education. ICT in education initiatives that focuses on the following areas are most likely to successfully contribute to meeting the Education For All (EFA) and Millennium Development Goals:

- Increasing access through distance – learning – ICTs can provide new and innovative means to bring educational opportunities to greater numbers of people of all ages, especially those who have historical been excluded, such as populations in rural areas, women facing social barriers, and students with disabilities.
- Enabling a knowledge network for students – with knowledge as the crucial input or productive processes within today's economy the efficiency by which knowledge is acquired and applied determines economic success. Effective use of ICTs can contribute to the timely transmission of information and knowledge, thereby helping education systems meet this challenge.
- Training teachers – Large numbers of school teachers will be needed to meet the EFA and Millennium Development Goals for education. The use of ICTs can help in meeting teacher training targets. Moreover, ICTs provide opportunities to complement on the job training and continuing education for teachers.
- Broadening the availability of quality education materials – network technologies have the potential to increase the availability of quality educational materials. Their interactivity and global reach allow for customized sharing of knowledge, materials, and database, quickly and cheaply over long geographic distances. Furthermore, online resources offer teachers access to a vast and diverse collection of educational materials, enabling them to design curricula that best meet the needs of the students.
- Enhancing the efficiency and effectiveness of educational administration and policy – New technologies can help improve the quality of administrative activities and processes, including human resource management, student registration, and monitoring of student enrollment and achievement.

Consistent with the goals of the new curriculum, the "Department of Education Information Technology Framework" lays down the action areas for ICT-integration in the basic education system from 2000 to 2005. These include school computerization, teacher training, IT curriculum development, multimedia content development, financing, and monitoring and evaluation.

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It can easily be observed that technological innovation in the multifarious fields of commerce, science and education, is fast developing such that it is difficult to foresee the technological revolution in the millennium, inclusive of educational changes. For certain, however, technological changes in education will make its impact on the delivery of more effective, efficient and humanizing teaching – and – learning.

But presently, we can identify three current trends that could carry on to the nature of education in the future. The first trend is the paradigm shift from teacher – centered to student – centered approach to learning. The second is the broadening realization that education is not simply a delivery of facts and information, but an educative process of cultivating the cognitive, affective, psychomotor, and much more the contemplative intelligence of the learner of a new age. But the third and possibly the more explosive trend is the increase in the use of new information and communication technology or ICT.

Already at the turn of the past century, ICT in its various forms and manifestation has made its increasing influence on education, and it is expected that the trend will speed up even more rapidly. Propelling this brisk development is the spread of the use of the computer, and the availability of desktop micro-computers affordable not only to cottage industries, business, and homes but also to schools.

For now, the primary roles of educational technology in delivering the school curriculum's instructional program have been identified.

- Upgrading the quality of teaching-and-learning in schools
- Increasing the capability of the teacher to effectively inculcate learning, and for students to gain mastery of lessons and courses.
- Broadening the delivery of education outside schools through non-traditional approaches to formal and informal learning, such as Open Universities and lifelong learning to adult learners.
- Revolutionizing the use of technology to boost educational paradigm shifts that give importance to student-centered and holistic learning.

It is a reality that technologies must be seen in their relationship to teaching as a whole and to the learning process in particular. Until this relationship is understood, intelligent or fruitful use of techniques cannot be expected. If these instructional technologies are properly used, they can present great opportunities for inspiring and improving learning because they offer a variety of ways to adjust to learning tasks and objectives to students' capacities and levels of maturity.

That educators are now more keenly aware of their responsibility to delivery the highest quality of education to learners, while also recognizing the need to use and integrate technology in the curriculum and the teaching-learning process of classroom instruction is a very good development. There is no doubt, however, that the concept of educational technology is a very complex one, made more sophisticated with the advent of what is called hypermedia or multimedia packages that include: text, audio, graphic image (still picture), animation and video clip.

According to Dennis (2006), hypermedia finds an application in what is known as Information and Communication Technology or ICT that includes tutorial software packages,

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webpages, simulation games, project management packages, and others. To cite an example, the hypermedia package in Economics which can be accessed through the Internet site WinEcon. In contains one hundred (100) hours of tutorial material including self-assessment questions and examinations, an economic database, an economic glossary, references to learning economic texts and lecture-suited features.

In realizing the aforementioned statutes and national policies, the Philippine Department of Education (DepEd) stresses that Information and Communication Technology (ICT) must be an integral part of all learning areas, both hardware and software. Hence, according to the education department of the country, e-learning and the use and application of ICT must be employed in all subjects because this is now the most variable intervention in educational reform.

Subsequently, when used appropriately, ICTs are powerful tolls than can improve motivation and engagement in the learning process; develop multiple intelligences through multimedia presentation of materials; facilitate comprehension of abstract concepts by making them more concrete; develop basic skills (reading, writing, arithmetic) by giving learners opportunities for practice; promote inquiry and exploration through the use of interactive learning resources; enhance information literacy, critical thinking, problem-solving and other higher order thinking skills; facilitate collaborative and cooperative learning by providing tools for learners to communicate and work with other learners and develop lifelong learning skills, including learning how to learn.

Everyday, Information and Communication Technology (ICT) advances by leaps and bounds, but as it advances we can be certain that educational technology will continue to play an important role in education.

On the other hand, it is also necessary that teachers should be exposed to the technology competencies in the different domains of ICT in order that they will become more effective as implementers of curriculum particularly teaching of ICT.

This situation has promoted the researcher to conduct this study with the purpose of determining the status of ICT instruction in the public secondary schools in Ramon Magsaysay High School.

Theoretical Framework

The study was premised on the theory of Symbolic Interactionism. According to Reynolds (2004), this is anchored on the major premises, namely; (a) individuals act toward things and people on the basis of the meanings that things have for them; (b) the meaning of such things are derived from, or arise out of the social interaction that individuals have with one another, and (c) these meanings and handled in, modified through, an interpretive process used by individual to deal with the things and other people they encounter. The symbolic interactionism perspective views the individual as a social product who is influenced by others but also maintains distance from other and is able to initiative individual action. Thus, this theory can contribute to increase the teachers' level of technology competencies on the basis of social interaction.

On the other hand, this theory of constructivist learning can be used to support the technology competencies of teachers.

Powell and Kalina (2009) believed that the need to construct one's own knowledge would immediately understand materials being taught to them thereby attaining high level of

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analysis and in-depth understanding in every aspect of learning endeavor. In other words, it is a manner of discovering and transforming complex information, checking against old rules or methods and revising rules / methods when they no longer work. There should be an active monitoring and consequent regulation and orchestration of one's cognitive process. Thus, it allows teachers to look at material from different perspectives and obtain complete understanding. By using technology, teachers can see materials from different angles and create their own knowledge and understanding of the materials. Likewise, Henson (2003) claimed that, "For educational system to serve the needs of every learner, it is essential that every instructional decision focuses on the individual learner with an understanding of the learning process".

Each teacher and learner is conceived as person within his psychological environment. The teacher's function is to help the learners develop insights toward the attainment of adequate and harmonious personalities removing the barriers to communication, thus, learning is facilitated. The learning situation to be of maximum value therefore must be realistic and meaningful to the learner and should take place within the rich and satisfying environment. Thus, the technology competencies of teachers can greatly help students in the attainment of quality, meaningful and workable learning.

Conceptual Framework

Providing quality learning is the main vision of the Department of Education (DepEd). But the specific vision cannot be realized unless quality teaching is there. And so, it is necessary to provide diversified teaching inputs in the attainment of the expectations considering that teaching does not exist in a vacuum. One important factor is to improve the level of teachers' competences in the teaching of Information and Communication Technologies (ICT). This is the reason why the researcher has decided to choose this research study dealing with ICT teaching because she believed that helping students to be aware of ICT can greatly improve their learning.

A schematic presentation of this study is illustrated in input-thruput (process)-output model. The input consisted of the profile of the respondent teachers as to age, educational attainment, teaching experience and seminars/training attended for the last two (2) years the availability of hardware and software technologies of teaches, the level of technology competencies in the different domains of ICT, strengths and needs of teachers including seriousness of problems encountered.

The process consisted of an analysis of the findings in different inputs and the formulation of a Proposed Plan of Action to address findings in the above stated areas.

Finally, the output which is anchored on the aforementioned findings is the proposed plan of action.

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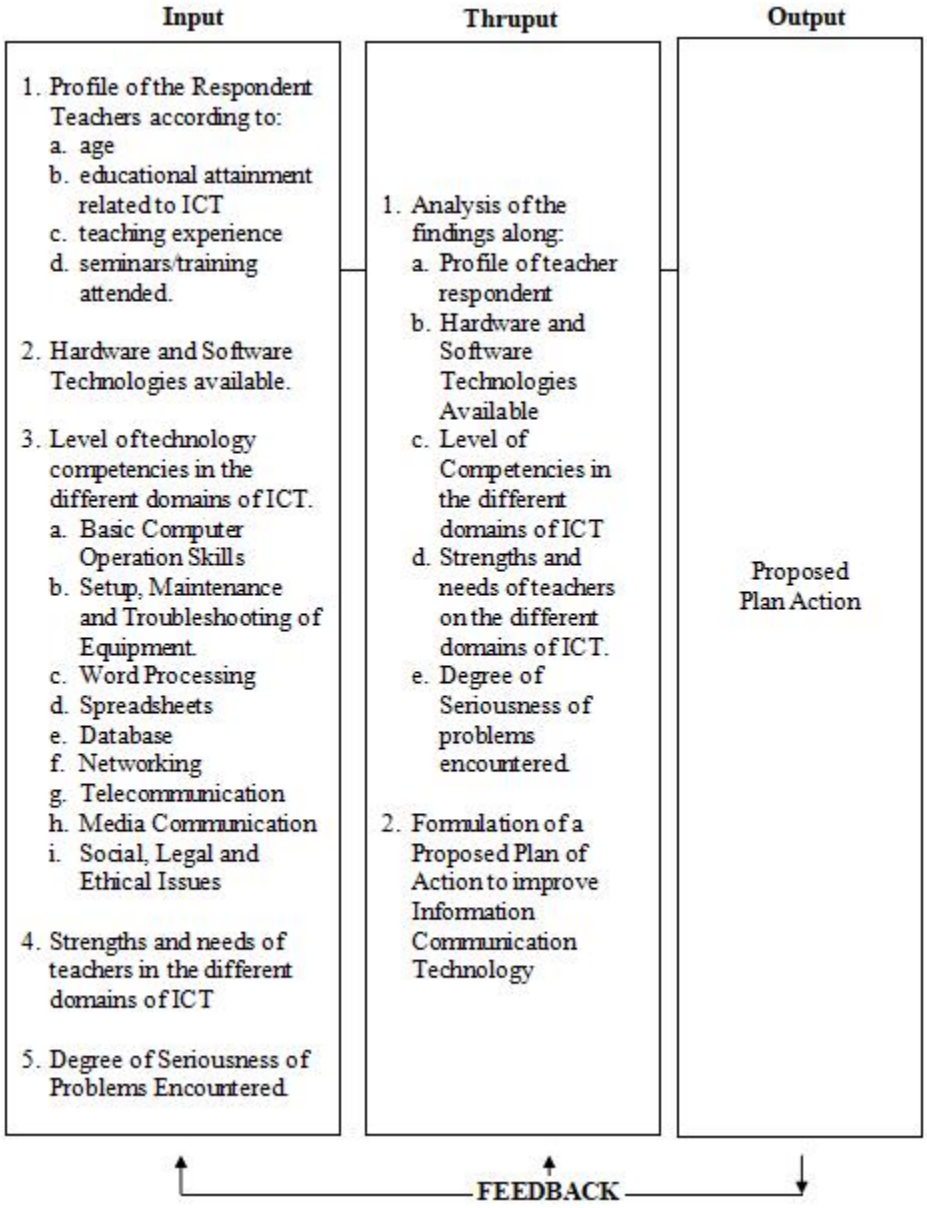

Figure 1 Paradigm of the Study

Statement of the Problem

This study seeks to determine the status of Information Communication Technology (ICT) instruction in public secondary schools in Ramon Magsaysay High School in the City of Manila during the school year 2025 – 2026.

Specifically, this study sought to answer the following questions:

1. What is the profile of the TLE teachers teaching ICT along the following variables?
   a. Age
   b. Educational Attainment related to ICT

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c. Teaching Experience
d. Seminars / Trainings Attended in ICT

2. What are the hardware and software technologies available in teaching ICT?
3. What is the level of technology competence of the teachers along the nine (9) domains of ICT?
   a. Basic Computer Operation Skills
   b. Setup, Maintenance and Troubleshooting of Equipment.
   c. Word Processing
   d. Spreadsheets
   e. Database
   f. Networking
   g. Telecommunication
   h. Media Communication
   i. Social, Legal and Ethical Issues
4. Are there significant differences in the level of technology competence of teachers across their profile variables?
5. What are the strengths and needs of the respondent teachers in the different domains?
6. What is the degree of seriousness of problems encountered by the respondent teachers in teaching ICT?
7. What plan of action can be proposed to improve the information technology competence of teachers?

Research Hypothesis

This study tested the null hypothesis at the .05 level of significance.

1. There is no significant differences in the level of technology competence of teachers across their profile variables.

Scope and Delimitation

The study focused primarily on the status of Information Communication Technology Instruction in public secondary schools in Ramon Magsaysay High School during the school year 2025 – 2026. Respondents of the study consisted of teachers teaching ICT in the whole Ramon Magsaysay High Schools.

The variables that will be investigate consisted of the profile of the respondents, the availability of hardware and software technology, level of teachers' competencies along the 9 domains of ICT, their strengths and needs in the different ICT domains and degree of seriousness of problems encountered.

Significance of the Study

The study is envisioned to benefit the following clientele groups:

Curriculum Planners. The findings of this study would provide information as to the kinds of instructional technologies extensively used by the public school teachers as a part of their planning.

School Administrators. The findings of this study would provide insights on the research-based information of in-service training to be provided likewise, the real estimates of how the schools have been provided to enhance the ICT competencies and skills of their teachers

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for instructional purposes.

ICT Teachers. The findings of this study would provide research-based information that enhances their level of ICT competencies in the different domains.

Pupils. The would benefit from all the improvements which would be initiated and implemented by the school administrators and the public secondary school teachers as a result of their awareness on ICT instruction.

Researcher. The findings of this study would provide meaningful experiences and insights in the gathering and organizing of data as well as for the improvement of teaching-learning manifestations.

Other Researchers. They could use the findings of this study for the conduct and interpretation of related researches.

Definition of Terms

In order to present a more thorough and comprehensive insight into this study, the following terms and phrases are lexically and operationally defined.

Basic Computer Operation Skill. It refers to the knowledge and ability to utilize computers and related technology efficiently (Courant, 2002).

Competence. It refers to the quality or state of being functionally adequate or of having sufficient knowledge, judgement, skill or strength for a particular discipline (Webster, 1956). In this study, it refers to the technology competencies of teachers in the nine domains of UCT, namely; Basic Computer Operation Skills, Setup, Maintenance and Troubleshooting of Equipment, Word Processing, Spreadsheets, Database, Networking, Telecommunication, Media Communication and Social, Legal and Ethical Issues.

Database. It refers to an organized collection of data or it refers to data themselves and supporting data structures. Data are typically organized to model relevant aspects of reality in a way that supports processes requiring information (Davies, 2004).

Hardware Technologies. They refer to audio visual aids which consist of machines or electronic devices. (DECS Service Manual 2000).

Information and Communication Technology (ICT). This refers to the integration of information processing computing and communication technologies. It is also changing the way we learn, work and live in society and are often spoken of in a particular context, such as in education, health care or libraries. It also covers any product that will store, retrieve information electronically in a digital form (Lucido, 2008).

Instruction. It refers to the practice of teaching or profession as to manner or technique of doing someday.

Instructional Technology. It refers to any device that helps teachers transfer to the learner facts, knowledge, attitude understanding and appreciation (Wittich and Schuller, 1985). In this study, it refers to the print and non-print materials including the audio-visual facilities and equipment and low-cost teaching aids a devices.

Media Communication. It refers to the means interchanging or transmitting and receiving information (Collin, 2003).

Networking. It refers to construction, design and use of network, including the physical (cabling, hub, bridge, router) the selection and use of telecommunication protocol and computer software including establishment of operation polices and procedures related to the network (Tanenbaum, 2006).

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Non-Print Materials. These refer to supplementary device other than print materials such as video tapes, audio-cassette tape films, transparencies, and multimedia learning packages, that aid the teaching and/or learning of certain concepts and skills as found DECS Service Manual 2000.

Setup, Maintenance and Troubleshooting. It refers to process of diagnosing the source of a problem. It is used to problems with hardware, software and many other products (Collin 2003).

Social, Legal and Ethical Issues. They refer to concerning how computers have affected the way society is organize and how people react and behave towards each other. Further, that refer to issues which have something to do with right or wrong (Collins, 2003).

Software Technologies. They refer to programs or corresponding materials for a computer. (DECS Service Manual 2000).

Spreedsheets. It refers to an interactive computer application program for organization and analysis of data in tabular form (Howard, 2005).

Telecommunication. It refers to communication at a distance by technological means particularly through electrical signals or electromagnetic waves (Collins 2003).

Word Processing. It refers to writing, editing and production of documents as letters, reports and books through the use of a computer program or a computer system designed to facilitate rapid and efficient manipulation of text. (Collins, 2003).

Domains of ICT Competencies

Computer skills literacy is defined as the knowledge and ability to utilize computers and related technology efficiently, with a range of skills covering levels from elementary use to programming and advanced problem solving. Computer literacy can also refer to the comfort level someone has with using computers. Another valuable component understands how computer work and operate.

Computer literacy is considered to be a very important skill to possess in developed countries. Employers want their workers to have basic computer skills because their company becomes ever more dependent on computers. Many companies try to use computers to help run their company faster and cheaper.

Computers are just as common as pen and paper are for writing, especially among youth. There seems to be an inversely proportional relationship between computer literacy and compositional literacy among first world computer users. For many applications – especially communicating – computers are preferred over pen, paper, and typewriters because of their ability to duplicate and retain information and ease of editing.

As personal computers become common-place and they become more powerful, the concept of computer literacy is moving beyond basic functionality to more powerful applications under the heading of multimedia literacy.

It is frequently assumed that as computer and Internet access become common-place in the first world, everyone in those countries must have equal and ready access to this technology, and to skills in how to effectively use it. There is, however, a significant digital divide in even the most technologically advanced and enable countries, with digital haves and have-nots. Older workers who do not use the internet at home and are computer illiterate may be frozen out of the job market even for relatively unskilled jobs such as clerking in an auto parts store.

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Troubleshooting

Troubleshooting is the process of diagnosing the source of a problem. it is used to fix problems with hardware, software, and many other products. The basic theory of troubleshooting is that you start with the most general (and often most obvious) possible problems, and then narrow it down to more specific issues.

Many product manuals have a "Troubleshooting" section in the back of the manual. This section contains a list of potential problems, which are often phrased in the form of a question. For example, if your computers' monitor is not producing an image, you may asked to answer the following troubleshooting questions:

1. Is the monitor plugged in to a power source?
2. Is the monitor turned on?
3. Is the monitor cable plugged into the computer?
4. Is the computer turned on?
5. Is the computer awake from sleep mode?

If the answers to all the above questions are Yes, there may be some additional questions such as:

1. Does your computer have a supporting video card?
2. Have you installed the necessary video card drives?
3. Is the monitor resolution set properly?

Typically, each of these questions will be followed by specific advise, where the answer is Yes or No. sometimes, this advise is presented as a flowchart diagram. This means each question is followed by a series of other questions, depending on the answer. However, in many cases, only single solutions are provided for each question.

Troubleshooting is something we all have to do at some point, though some of us have to troubleshoot product problems more often than others. The good news is that, the more you do it, the more you learn and the better you get at fixing problems. Since many products have similar troubleshooting steps, you may find that after awhile, you don't even need the manual to find solutions to the problems encounter.

Word Processing

Using a computer to create, edit, and print documents. Of all computer applications, word processing is the most common. To perform word processing, you need a computer, a special program called a word processor, and a printer. A word processor enables you to create a document, store it electronically on a disk, display it on a screen, modify it by entering commands and characters from the keyboard, and print it on a printer. Recommended Reading: SOHO Business Solutions: Office Productivity Software.

Word Processing Compared to Using a Typewriter

The great advantage of word processing over using a typewriter is that you can make changes without retyping the entire document. If you make a typing mistake, you simply back up the cursor and correct your mistake. If you want to delete a paragraph, you simply remove it, without leaving a trace. It is equally easy to insert a word, sentence, or paragraph in the middle

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of a document. Word processors also make it easy to move sections of text from one place to another within a document, or between document. When you have made all the changes you want, you can send the file to a printer to get a hard copy. Word processing is writing, editing, and production of documents, as letters, reports, and books, through the use of computer program or a complete computer system designed to facilitate rapid and efficient manipulation of text. It is the composition of documents using a computer system to input, edit, store, and print them.

Spreadsheets

A spreadsheet is an interactive computer application program for organization and analysis of data in tabular form. Spreadsheets developed as computerized simulations of paper accounting worksheets. The program operates on data represented as cells of an array, organized in rows and columns. Each cell of the array is a model-view-controller element that can contain either numeric or text data, or the results of formulas that automatically calculate and display a value based on the contents of other cells.

The user of the spreadsheet can make changes in any stored value and observe the effects on calculated values. This makes the spreadsheet useful for "what-if" analysis since many cases can be rapidly investigated without tedious manual recalculation. Modern spreadsheet software can have multiple interacting sheets, and can display data either as text and numerals, or in graphical form.

In addition to the fundamental operations of arithmetic and mathematical functions, modern spreadsheets provide built-in functions for common financial and statistical operations. Such calculation as net present value or standard deviation can be applied to tabular data with a pre-programmed function in a formula. Spreadsheet programs also provide conditional expressions, functions to convert between text and numbers, and functions that operate on strings of text.

Spreadsheets have now replaced paper-based systems throughout the business world. Although they were first developed for accounting or bookkeeping tasks, they now are used extensively in any context where tabular lists are built, sorted and shared.

VisiCalc was the first electronic spreadsheets on a microcomputer, and it helped turn the Apple II computer into a popular and widely used system. Lotus 1-2-3 was the leading spreadsheet when DOS was the dominant operating system. Excel now has the largest market share on the Windows and Macintosh platforms. A spreadsheet program is a standard feature of an office productivity suite; since the advent of web apps, office suites now also exist in web app form.

A modern spreadsheet file consists of multiple **worksheets** (usually called by the shorter name **sheets**) that make up one **workbook,** with each file being one workbook. A cell on one sheet is capable of referencing cells on other, different sheets, whether within the same workbook or even, in some cases, in different workbooks.

Spreadsheets share many principles and traits of databases, but spreadsheets and databases are not the same thing. A spreadsheet is essentially just one table, whereas a database is a collection of many tables with machine – readable semantic relationships between them. While it is true that a workbook that contains three sheets is indeed a file containing multiple tables that can interact with each other, it lacks the relational structure of a database. Spreadsheets and databases are interoperable – sheets can be imported into databases are interoperable – sheets can be imported into databases to become tables within them, and database

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queries can be exported into spreadsheets for further analysis.

A spreadsheet program is one of the main components of an office productivity suite, which usually also contains a word processor, a presentation program, and a database management system. Programs within a suite use similar commands for similar functions. Programs within a suite use similar commands for similar functions. Usually sharing data between the components is easier that with a non-integrated collection of functionally equivalent programs. This was particularly an advantage at a time when much personal computer system used text-mode displays and commands, instead of a graphical user interface.

The word "spreadsheet" came from "spread" in its sense of a newspaper or magazine item (text and / or graphics) that covers two facing pages, extending across the center fold and treating the two pages as one large one. The compound word "spread-sheet" came to mean the format used to present book-keeping ledgers – with columns for categories of expenditures across the top, invoices listed down the left margin, and the amount of each payment in the cell where its row and column intersect – which were, traditionally, a "spread" across facing pages of a bound ledger (book for keeping accounting records) or on oversized sheets of paper (termed "analysis paper") ruled into rows and columns in that format and approximately twice as wide as ordinary paper.

Early Implementations

Batch Spreadsheet Report Generator

A batch "spreadsheet" is indistinguishable from a batch compiler with added input data, producing an output report, i.e., a 4GL or conventional, non-interactive, batch computer program. However, this concept of an electronic spreadsheet was outlined in the 1961 paper "Budgeting Models and System Simulation" by Richard Mattessich. The subsequent work by Mattessich (1964a, Chpt. 9, Accounting and Analytical Methods) and its companion volume, Mattessich (1964b, Simulation of the Firm through a Budget Computer Program) applied computerized spreadsheets to accounting and budgeting systems (on mainframe computers programmed in FORTRAN IV). These batch Spreadsheets dealt primarily with the addition or subtraction of entire columns or rows (of input variables), rather than individual cells.

In 1962 this concept of the spreadsheet, called BCL for Business Computer Language, was implemented on an IBM 1130 and in 1963 was ported on an IBM 7040 by R. Brian Walsh at Marquette University, Wisconisin. This program was written in Fortran. Primitive timesharing was available on those machines. In 1968 BCL was ported by Walsh to the IBM 360/67 timesharing machine at Washington State University. It was used to assist in the teaching of finance to business students. Students were able to take information prepared by the professor and manipulate it to represent it and show ratios etc. in 1964, a book entitled Business Computer Language written by Kimball, Stoffells and Walsh and both the book and program were copyrighted in 1966 and years later that copyright was renewed.

Database

A **database** is an organized collection of data. The data are typically organized to model relevant aspects of reality in a way that supports processes requiring this information. For example, modelling the availability of rooms in hotels in a way that supports finding a hotel with vacancies.

Database management system (DBMSs) are specially designed software applications

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that interact with the user, other applications, and the database itself to capture and analyse data. A general-purpose DBMS is a software system designed to allow the definition, creation, querying, update, and administration of databases. Well-known DBMSs include MySQl, MariaDB, PostgreSQl, SQLite, Microsoft SQL Server, Oracle, SAP, Dbase, FoxPro, IBM DB2, LibreOffice Base FileMaker Pro. A database is not generally portable across different DBMS, but different DBMSs can interoperate by using standards such as SQL and ODBC or JDBC to allow a single application to work with more than one database.

Formally, "database" refers to the data themselves and supporting data structures. Database are created to operate large quantities of information by inputting, storing, retrieving, and managing that information. Databases are set up so that one set of software programs provides all users with access to all the data.

A "database management system" (DBMS) is a suite of computer software providing the interface between users and a database or databases. Because they are so closely related, the term "database" when used casually often refers to both a DBMS and the data it manipulates.

Outside the world of professional information technology, the term database is sometimes used casually to refer to any collection of data (perhaps a spreadsheet, maybe even a card index). This article is concerned only with dtabases where the size and usage requirements necessitates use of a database management system.

The interactions catered for by most existing DBMS fall into four main groups:

- **Data definition** – Defining new data structures for a database, removing data structures for a database, removing data structures from the database, modifying the structure of existing data.
- **Update** – inserting, modifying, and deleting data.
- **Retrieval** – obtaining information either for end-user queries and reports or for processing by applications.
- **Administration** – registering and monitoring users, enforcing data security, monitoring performance, maintaining data integrity, dealing with concurrency control, and recovering information if the system fails.

A DBMS is responsible for maintaining the integrity and security of stored data, and for recovering information if the sytem fails.

Both a database and its DBMS conform to the principles of a particular database model. "Database system" refers collectively to the database model, database management system, and database.

Physically, database servers are dedicated computers that hold the actual databases and run only the DBMS and related software. Database servers are usually multiprocessor computers, with generous memory and RAID disk arrays used for stable storage. RAID is used for recovery of data if any of the disks fail. Hardware database accelerators, connected to one or more servers via a high-speed channel, are also used in large volume transaction processing environments. DBMSs are found at the heart of most database applications. DBMSs may be built around a custom multitasking kernel with built-in networking support, but modern DBMSs typically rely on a standard operating system to provide these functions. Since DBMSs comprise a significant economical market, computer and storage vendors often take into account DBMS requirements in their own development plans.

Database and DBMSs can be categorized according to the database model(s) that they support (such as relational or XML), the type(s) of computer they run on (from a server cluster to

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a mobile phone), the query language(s) used to access the database (such as SQL or XQuery), and their internal engineering, which affects performance, scalability, resilience, and security.

Networking

A **computer network** or **data network** is a telecommunications network that allows computers to exchange data. In computer networks, networked computing devices pass data to each other along data connections. The connections (network links) between nodes are established using either cable media or wireless media. The best – known computer network is the Internet.

Network computer devices that originate, route and terminate the data are called network nodes. Nodes can include hosts such as servers and personal computers, as well as networking hardware. Two devices are said to be networked when a device is able to exchange information with another device.

Computer networks support applications such as access to the World Wide Web, shared use of application and storage servers, printers, and fax machines, and use of email and instant messaging applications. Computer networks differ in the physical media used to transmit their signals, the communication protocols to organize network traffic, the network's size, topology and organizational intent.

Today, computer networks are the core of modern communication. All modern aspects of the public switched telephone network (PSTN) are computer – controlled. Telephony increasingly runs over the Internet Protocol, although not necessarily the public Internet. The scope of communication has increased significantly in the past decade. This boom in communications would not have been possible without the progressively advancing computer network. Computer networks, and the technologies that make communication between network computers possible, continue to drive computer hardware, software, and peripherals industries. The expansion of related industries is mirrored by growth in the numbers and types of people using networks, from the researcher to the home user.

Computer networking may be considered a branch of electrical engineering, telecommunications, computer science, information technology or computer engineering, since it relies upon the theoretical and practical application of the related disciplines.

A computer network has the following properties: **Facilitates interpersonal communications.** People can communicate efficiently and easily via email, instant messaging, chat rooms, telephone, video telephone calls, and video conferencing. **Allows sharing of files, data, and other type of information.** Authorized users may access information stored on other computers on the network. Providing access to information on shared storage devices is an important feature of many networks. **Allows sharing of network and computer resources.** Users may access and use resources provided by devices on the network, such as printing a document on shared network printer. Distributed computing uses computing resources across a network to accomplish tasks. **May be insecure.** A computer network may be used by computer Hackers to deploy computer viruses or computer worms on devices connected to the network, or to prevent these devices from accessing the network.

Telecommunication

Telecommunication is communication at a distance by technological means, particularly through electrical signals or electromagnetic waves. Due to the many different technologies

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involved, the word is often used in a plural form. As **telecommunications.**

Early telecommunication technologies included visual signals, such as beacons, smoke signals, semaphore telegraphs, signal flags, and optical heliographs. Other examples of pre-modern telecommunications include audio messages such as coded drumbeats, lung-blown horns, and loud whistles. Electrical and electromagnetic telecommunication technologies include telegraph, telephone, and teleprinter, networks, radio, microwage transmission, fiber optics, communications satellites and the Internet.

A revolution in wireless telecommunications began in the 1900s with pioneering developments in radio communications by Guglielmo Marconi. Marconi won the Nobel Prize in Physics in 1909 for his efforts. Other highly notable pioneering inventors and developers in the field of electrical and electronic telecommunications include Charles Wheatstone and Samuel Morse (telegraph), Alexander Graham Bell (telephone), Edwin Armstrong, and Lee de Forest (radio), as well as John Bogie Baird and Philo Farnsworth (Television).

The word's effective capacity to exchange information through two-way telecommunication networks grew from 281 petabytes of (optimally compressed) information in 1986, to 471 petabytes in 1993, to 2.2 (optimally compressed) exabytes in 2000, and to 65 (optimally compressed) exabytes in 2007. This is the informational equivalent of two newspaper pages per person per day in 1986, and six entire newspapers per person per day by 2007. Given this growth, telecommunications play an increasingly important role in the world economy and the global telecommunications industry was about a $4.7 trillion sector in 2012. The service revenue of the global telecommunications industry was estimated to be $1.5 trillion in 2010, corresponding to 2.4% of the world's gross domestic product (GDP).

Media Communication

The **mass media** are diversified media technologies that are intended to reach a large audience by mass communication. The technologies through which this communication takes place varies. Broadcast media such as radio, recorded music, film and television transmit their information electronically. Print media use a physical object such as a newspaper, book, pamphlet or comics, to distribute their information. Outdoor media is a form of mass media that comprises billboards, signs or placards placed inside and outside of commercial buildings, sports stadiums, shops and buses. Other outdoor media include flying billboards (signs in tow of airplanes), blimps, and skywriting. Public speaking and event organizing can also be considered as forms of mass media. The digital media comprises both internet and mobile mass communication. Internet media provides many mass media services, such as email, websites, blogs, and internet based radio and television. Many other mass media outlets have a presence on the web, by such things as having TV ads that link to a website, or distributing a QR Code in print or outdoor media to direct a mobile user to a website. In this way, they can utilize the easy accessibility that the Internet has, and the outreach that Internet affords, as information can easily be broadcast to many different regions of the world simultaneously and cost-efficiently. The organizations that control these technologies, such as television stations or publishing companies, are also known as the mass media.

In the late 20th Century, mass media could be classified into eight mass media industries: books, newspapers, magazines, recordings, radio, movies, television and the internet. With the explosions of digital communication technology in the late 20th and early 21st centuries, the question of what forms of media should be classified as "mass media" has become more

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prominent. For example, it is controversial whether to include cell phones, video games and computer games (such as MMORPGs) in the definition.

Video games may also be evolving into a mass medium. Video games convey the same messages and ideologies to all their users. Users sometimes share the experience with each other by playing online. Excluding the internet however, it is questionable whether players of video games are sharing a common experience when they play the game separately. It is possible to discuss in great detail the events of a video game with a friend you have never played with because the experience was identical to you both. The question is if this is then a form of mass communication.

Massively multiplayer online role-playing games (MMORPGs) such as Runescape provide a common gaming experience to millions of users throughout the globe. It is arguable that the users are receiving the same message, i.e., the game is mass communicating the same message to the various players.

Available of Hardware and Software Technologies

In this book, Oversold and Underused: Computers in the Classroom, Larry Cuban (2004) lamented that the overwhelming majority of teachers used information technology (IT) to sustain existing patterns of education, rather than to innovate. When innovations of any kind are introduced to educators, most teachers adapt them to fit their customary teacher-centered practices.

Neil (2003) pointed out that most teachers who use technologies do to develop students' computer-specific skills such as word processing. The development of higher – ordered mathematical, problem – solving or reasoning skills are rare. Rather than revolutionizing education, these innovations perpetuate traditional teaching methods. Thus, the educational reforms that businessmen, educators, public officials and parents seek are unachieved. Increased productivity, higher student achievement, and the transformation of learning remain unrealized. In Cuban's view, the billions of dollars invested in IT have yet to produce commensurate outcomes. He found out that sixty-one percent of teachers assigned students word processing or spreadsheet work, while 50% of teachers gave problem solving and data analysis assignments.

Romano (2006) stated that Information Communication Technology presented a challenge administrators and teachers because they were forced to incorporate this definition of a classroom. Further, teachers have been willing to embrace the increasingly new advances in technology and adopt them into the curriculum in order to expand student learning experiences.

As Beichner (2005) pointed our that the key to bringing the gap between teachers and technology is to redefined the role of the teacher. "As computers begin to provide students with access to vast amounts of information and powerful new ways to explore it, teachers become not so much authorities as guides. Giving up the traditional role as 'the fount of knowledge' might be threatening to some teachers, coupled with the fact that some students will inevitably know more about computers than their teachers. Even though students are capable of learning from technology without the aid of the teacher, in particularly through the use of subject-specific computer software, does not mean that the human element required by education will be broken. Students will always need encouragement and reinforcement to achieve to their potential. "Strategies for change in what happens in the classroom must be based on the truth human beings have always been conditioned to learn under the guidance of other humans.

Keirn's study (2003) concluded that after taking a college course to improve their

computer competency, teachers became more confident in their computer skills and learned more about the advantages of using the computer for educational purposes. These conclusions have been reached in a number of case studies, supporting the conclusion that teachers are open to the use of technology, but they are looking for guidance. Even though self-instruction has worked for some teachers, we cannot reasonably expect all new teachers to become computer literate on their own. It teachers are to take full advantages of technology, and be aware of its limitations, they need to begin learning about technology during their pre-service coursework".

Although the problems that teachers face when implementing technology can be partially solved by educating them in the uses of technology, it is futile unless they know how to bring technology to their students.

Luehrmann (2014) stated that the most important thing a school can do with a computer is to teach students to become literate users of the computer, not just recipients of computerized lessons. There are two keys ways that students are exposed to technology: software and computer science. Software includes subject – specific software, such as remedial math software and others. Further, students have access to word processing and presentation software.

Wilkinson (2014) in his book "Classroom Computers and Cognitive Science" emphasized that the closest that students come to interacting with technology on a fundamental level is through computer science. Computer science allows students to create programs, essentially their own software, giving them a different view of the capabilities of computers. "Learning to program a computer to perform user defined tasks frequently involves several learning experiences that are not otherwise sustainable. By writing computer programs, children develop a familiarity with the computer learning environment that they do not get from working with a prepared software program". As technology continues to develop, educators and students need to discover how to use all aspects of it is in the educational settings.

Creighton (2013) stated that if ICT is being used effecting, it enables data driven decision making. It minimizes the guesswork, opinion, and emotions in the decision-making process, the replaces these with quantifiable proof. It also enables educators and decision-makers to gain informed and thoughtful perspective of current situations, options, and considerations before formulating plans of action.

As the Commission of Information and Communication Technology (2005) disclosed that effective use of ICTs in education planning and management presupposes that education administrators and non-teaching staff are skills ICT users. At the minimum, they should be able to use a computer to create and process documents, perform computations, communicate, and make presentations, following norms for acceptable use. Furthermore, education administrators and non-teaching staff need specialized competencies that enable them to use ICT hardware and software optimally in fulfilment of their job functions.

As pointed out by Carlson and Gadio (2013) teachers and instructional managers have an important role in ensuring that the use of ICTs results in effective learning. "Educational technology is not, and never will be, transformative on its own-it requires teachers who can integrate technology into the curriculum and use it to improve students learning, teaches are the key to whether technology is use appropriately and effectively".

Likewise, according to them effective teaching in ICT-enhanced learning environments requires teachers and instructional managers to develop not only ICT skills but also appropriate pedagogical competencies, such as skills in asking meaningful questions and in "interpreting information by integrating it with previously accumulated knowledge and giving it an

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appropriate context". They must have the ability to develop higher – order thinking, information – reasoning skills, and collaborative learning skills "which are increasingly required in today's knowledge economy". It also requires teaches and instructional managers to be more learner-centered, "interdisciplinary…and adaptive to individual learning styles".

Calderon (2015) stated that the main purpose of using ICT materials is to make abstract ideas and concepts better understood if they are represented by concrete form has not been yet. Take for instance, the word carbao, to the city children who have not seen any carabao yet, the term carabao is very abstract to them. No matter how much the carabao is describe to them, they cannot form a definite picture of what is carabao is. But once they have seen the picture of a carabo or the carabao itself, they understand what a carabao is even without any description.

There are terms that cannot be represented by concrete object such as principles, spirit, and the like although principles in science and technology can be demonstrated by using tangible objects and instruments. Ideas and concepts that cannot be represented by concrete objects may be explained in terms that are better understood or by their manifestations.

Salandana (2016) pointed out that ICT technologies can be utilized in presenting a new lesson or topic. A display of colored popular photographs on the bulletin board will surely catch class' attention. Samples of common real object can easily involve them in a lesson, presenting events and landscapes can be brought to the classroom through appropriate media like television viewing or constructing diorama, indivdiualized instruction according to the student's learning styles, take off prints for planned learning activities such as videotapes, recorder, transparencies and projectors. There are stored and are made available.

As Lucido (2016) stated some instructional technologies which can contribute effectively to instruction. Among them are: radio, phonograph, tape recorder, telephone, slide, film strips, opaque projector, overhead projector, calculator, computer, internet, motion picture, and television.

Morison (2020) stated that when teacher-centered classrooms use software, they often use drill and practice activities. Drill and practice software affords rote memorization and a behaviourist to teaching and learning thus maintaining the status quo. Students may learn from this technology as it displaces the teacher or acts as a teaching aid. However, students continue to be passive receivers of information as the model persists. Learning from computers supports a traditional, didactic model of education whereas learning with computers represents a shift in the learning continuum.

As Niederhauser (2016) pointed out that teachers' use of instructional technology seems to be shifting away from a didactic model towards a more hands-on approach for their students. Although there as various educational implication for each model has for integrating technology in the secondary classrooms as "technologies haves the potential to fundamentally change the way we think about teaching and learning".

Hall and Higgins (2015) disclosed that in teacher – centered classrooms, it is often the teacher, not the student who uses technological tools.

Furthermore, teachers in these classrooms often use technology to deliver instruction or for demonstration purpose. For example, when teachers present a PowerPoint slideshow or use an interactive whiteboard as a demonstration tool, students are not interacting with technology but are merely observers of technology use. The use of a newer technology may capture

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students' interests, but the structure of the lesson and its delivery remains the same. When technology is used to deliver instruction, 21st century skills are not required and the context is less authentic and focused more on retention of act or procedural knowledge.

Macatangay (2012) conducted a study on Educational Technology in the Teacher Education Program of Philippine Schools. Her findings revealed that teacher respondents encountered problems on lack of training in the utilization of instructional technologies and absence of educational media centers in schools.

Escalante (2020) conducted a study on the Assessment of the Educational media materials. His findings revealed that there were insufficient quantities of visual aids in the district of Allacapon Cagayan. He further disclosed that the visual aids contributed a lot to improve classroom instruction.

Lozano (2021) investigate Educational Media in Selected Teacher Training Institution in the Philippines. She found out that educational media materials and equipment used more frequently belonged to the traditional types of instructional technologies. Never types of instructional technologies were utilized only by the teacher – training institutions found in the greater Manila area and the more progressive nearby provinces.

Blondin (2020) conducted a study to determine some of the Deterrents in the utilization of Educational Media. She disclosed the following problems along level of adequacy and extent of utilization of instructional technologies: (1) financial difficulties (2) untrained teachers (3) inadequate of instructional equipment and (4) indifference of supervisor toward the use of instructional technologies.

Tinio (2012) conducted a survey of ICT Utilization in Philippine Public High Schools. His survey revealed the following: 52% of the respondents said that at most, only half their teachers have some knowledge of computer fundamentals and can use productivity tools. In 13% of the schools, 10% or less of the teachers have basic computer skills. In almost a third of the school (29%) at least 75% of the teaching staff is computer literate, and the number of teachers with internet skills (e.g. ability to use email and do research online is much lower) 75% of the school reported that only up to 10% of their teachers have the Internet Skills for teaching – related activities.

Masagca (2014) pointed out that the accountability of teachers in integrating ICT in the school curriculum must be greatly considered so that effectiveness and efficiency could be ensured.

Rodrigo (2015) conducted a study on Information Technology Usage in Metro Manila Public and Private Schools. Her findings revealed that Metro Manila Primary School students have low access in computers. Private primary schools are better equipped than public primary schools. Other findings revealed that the most serious problems encountered are lack of funds and lack of know – how.

Summing up, the related literature and studies herein revealed several ideas / concepts relevant to the present study. Worth mentioning are the ideas presented by Macatangay, Escalante, Lozano, Blondin, Tinio, Masagca, Rodrigo and researches in the Internet which stressed more on the preparation and proper utilization of coherent, relevant and appropriate instructional materials as tools to enhance students' conceptualization of lessons for wider parameter of understanding. Likewise, they also revealed some common problems encountered by the teacher respondents in the extent of utilization of the said instructional technologies like insufficient funding, lack of adequate training, lack of audio-visual equipment, poor quality and

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other including survey of ICT utilization by the teachers. All the above-mentioned literature and studies are more or less related to the present study on Information and Communication Technology.

II. RESEARCH METHODOLOGY

This chapter presents the methods and procedures adopted by the researcher in conducting the study.

Research Design

The research method used in this study is the descriptive research method. This method is used to establish the prevailing status or conditions to situations which call for the analysis of difference without variable manipulation. The use of the descriptive method is appropriate since, this study sought to determine in detail the status of information communication technology instruction in terms of the teachers' profile, availability of hardware and software technology, level of competencies in the 9 domains of ICT, strengths and needs of teachers in the different ICT domains and the seriousness of problems they have encountered.

Locale and Population of the Study

The study was conducted in the Ramon Magsaysay National High School, Manila. It included fifteen (15) public secondary school with 64 TLE teachers teaching Information and Communication Technology.

Table 1 presents the distribution of teachers by year level.

Table 1
Distribution of Respondents by Schools

Schools	Number of Teachers	School Heads

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Data Gathering Instrument

The data required to answer the problems of the study were gathered using a questionnaire for the TLE teachers.

Part I of the questionnaire dealt with the profile variables of the teacher respondents namely: age, educational attainment related to ICT, number of years of teaching experience and seminars / training attended in ICT.

Part II of the questionnaire considered of the list of hardware and software technologies based on the list found in DECS Service Manual (2000).

Part III dealt with the level of technology competence of teachers along the nine (9) domains of ICT. The nine (9) domains and the corresponding competencies were taken from the Basic Technology Competencies of Educator's Inventory (BTCEI, 2013).

Finally, Part IV consisted of the problems teachers encountered in teaching ICT. The problems listed were based on the rsearchers' readings and other materials related to ICT as well as from her interviews with ICT teachers in Ramon Magsaysay High School, Metro Manila.

Data Gathering Procedure

The researcher first sought permission from the Schools Division Superintendent to conduct the study in the 15 National High Schools of Ramon Magsaysay High School.

Once granted, the questionnaire was personally administered by the researcher to the TLE teachers in the fifteen (15) public secondary schools. The distribution, administration and retrieval of the instrucment lasted for one week. The researcher was able to retrieve all the questionnaires from the respondents teachers.

Statistical Treatment of Data

Problem number 1 on the profile of the respondent teachers was answered by using frequency counts and percentages.

Problem number 2 on the availability of hardware and software technologies was answered by using check mark (/) frequency counts and percentages.

Problem number 3 on the level of technology competencies of public secondary school teachers in the different domains of ICT was answered by using the 4 – value Likert Scale and was subjected to average weighted mean (AWM) with descriptive equivalent.

Score	Scale	Descriptive Equivalent
4	3.41 – 4.20	Very Competent (VC)
3	2.61 – 3.40	Competent (C)
2	1.81 – 2.60	Somewhat Competent (SC)
1	1.00 – 1.80	Not Competent (NC)

Problem number 4 on the significant differences in the level of technology competencies across profile variables as perceived by teachers respondent themselves was answered by using Analysis of Variance (ANOVA) and t-test accordingly. ANOVA was employed under profile age, teaching experience and seminars/trainings attended for the last 2 years and was subjected to post-hoc test particularly the Scheffe's test or S-test to determine those means that are different from each other while t-test was applied under variable educational attainment.

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Formula for ANOVA

$$F = \frac{\text{Mean-Square for Between Mean}}{\text{Mean-Square for Within Mean}}$$

Formula for t-test:

$$t = \frac{\overline{X}_1 - \overline{X}_2}{SD\overline{x}}$$

where:

$\overline{X}_1$ = First Mean
$\overline{X}_2$ = Second Mean
$SD\overline{x}$ = Standard error of difference between the two means

Post-hoc test using the Scheffe's test or S-test

$$F = \frac{X_1 - X_2}{S^2w(N_1+N_2) \div N_1N_2}$$

Problem number 5 on the determining the strengths and needs of the respondent teachers in the different domains was answered by using the 4-value Likert Scale. An average weighted mean of 2.51 and Above are classified as "Strengths" while an average weighted mean of 2.50 and Below are classified as "Needs".

Problem number 6 on determining the degree of seriousness of problems encountered by the respondent teachers was answered by using the 3-value Likert Scale.

The average weighted mean and verbal descriptive are as follows:

3	2.34 – 3.00	Serious (S)
2	1.67 – 2.33	Moderately Serious (MS)
1	1.00 – 1.66	Not Serious (NS)

The formula of average weighted mean is:

$$Xw = \frac{fxw}{N}$$

where:

X_W = Weighted Mean
f = Frequency of responses of respondent
w = Weighted of the category responses
N = Total number of respondents

Problem number 7 on the proposed plan of action was formulated based on the findings of the study, strengths and needs including seriousness of problems encountered by the teachers in teaching ICT.

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III. PRESENTATION, ANALYSIS and INTERPRETATION of DATA

This chapter presents the data gathered and are analyzed and interpreted in the light of the problems presented.

PROFILE OF THE TEACHER RESPONDENTS

Age

Table 2 presents the age classification of teacher respondents.

Table 2
Profile of the Teacher Respondents Along Age
(N=64)

Age	Frequency	Percentage
22 – 39 years	36	56.25%
40 – 59 years	16	25%
60 years and above	12	18.75%
Total	**64**	**100%**

It is evident in table 2 that 36 or 56.25% of the teacher respondents are within the bracket of 22 – 39 years which are classified as Young Adult. On the other hand, 16 or 25% of the total 40 – 59 years categorized as Middle Adult. However, there are 12 or 18.75% aging 60 years and Above. These are classified as Old Adult.

Further analysis of the data reveal that most of the teacher respondents are young. They constitute more than 50% of the total respondents. Generally, young teachers are enthusiastic and aggressive to perform their functions more efficiently and effectively, considering that they are still physical healthy and strong.

On the other hand, a few of teachers are classified as Old Adult teachers 18.75%. This goes to show that these teachers have already long in the service and are about to retire.

This further indicates that the teacher respondents vary in terms of age classifications.

Educational Attainment Related to ICT

Table 3 presents the educational attainment related to ICT.

Table 3
Profile of the Teacher Respondents Along
Educational Attainment Related to ICT
(N=64)

Educational Attainment	Frequency	Percentage
With ICT background	28	43.75%
Without ICT background	36	56.25%
Total	**64**	**100%**

Data on the table reveal that 28 or 43.75% of teacher respondents have ICT background. Of the 28 teacher respondents, 8 or 28.57% are major in Technology and Livelihood Education, 8 or 28.57% are major in Technology and Livelihood Education, 5 or 17.86% in Agri-Technology, 2 or 7.14% in Industrial Technology and 4 or 14.28% in Business Technology, 2 or 7.14% are minor in ICT and 3 or 10.72% have Basic Programming Computer as their area of specialization.

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Similarly, 1 or 3.57% and 3 or 10.72% are graduates of Bachelor of Science in Information Technology (BSIT) and Bachelor of Science in Computer Education (BSCE) respectively. 36 or 56.25% do not have background in ICT.

Findings show that only eight (8) have background in ICT. All the others who teach ICT do not have the needed educational qualification to handle the course. Hence, there efficiency and effectiveness as ICT teachers is subject to question. This creates a situation where students may not learn the skills and competencies expected of them.

Tinio (2002) pointed out that teachers should be computer literate in order to carry out their tasks more systematically, efficiently and as well as effectively.

Years of Teaching Experience

Table 4 presents the profile of teachers respondents along years of teaching experience.

Table 4
Profile of the Teacher Respondents Along Number of Years of Teaching Experience
(N=64)

Teaching Experience	Frequency	Percentage
0 – 7 years	18	28.12%
8 – 15 years	22	34.38%
16 years and above	24	37.50%
Total	**64**	**100%**

Table 4 reveals that 18 or 28.12% of the teacher respondents have teaching experiences from 0 – 7 years; 22 or 34.38 have teaching experiences from 8 – 15 years and 24 or 37.50% are from 16 years and above. A closer scrutiny of the data reveals that majority of the teacher respondents long in the service and thus, are considered as experienced teachers.

Seminars / Training Attended in ICT

Table 5 presents the profile of the teacher respondents in seminars/trainings in ICT.

Table 5
Profile of the Teacher Respondents Along Seminars/Training Attended in ICT
(N=64)

Seminars / Training Attended (In Terms of Attendance)	Frequency	Percentage
1 – 2	22	34.38%
3 – 4	26	40.62%
5 and above	16	25%
Total	**64**	**100%**

Data in table 5 reveal that out of 64 teacher respondents, 22 or 34.38% have 1 – 2 attendance in ICT; 26 or 40.62% have acquired 3 – 4 attendance in ICT and 16 or 25% have 5 and above attendance.

Further analysis of the findings reveal that teachers have attended only a few seminars/trainings in ICT. This implies that they may not have acquired fully all the skills and

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competencies required to teach efficiently and effectively.

Availability of Hardware and Software Technologies in Teaching ICT

Table 6 presents the frequency counts and percentage scores on the availability of Hardware and Software technologies in the 15 National High Schools.

Table 6
Percentage Scores in the Availability of Hardware and Software Technologies in Teaching ICT
(N=15)

Availability of Hardware Technologies	Schools															Frequency	Percentage
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
HARDWARE (MACHINES)																	
Computer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	15	100%
Video machines		✓												✓		2	13%
Television	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	15	100%
Radio	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	13	87%
Tape Recorder	✓				✓	✓				✓	✓	✓		✓	✓	8	53%
Overhead projector	✓				✓					✓		✓		✓	✓	6	40%
Movie projector	✓									✓					✓	3	20%
Slides projector	✓	✓								✓				✓	✓	5	33%
Filmstrips projector		✓			✓									✓	✓	4	27%
Frequency	**7**	**6**	**3**	**2**	**6**	**4**	**3**	**3**	**2**	**7**	**4**	**5**	**3**	**8**	**8**	**71**	**53%**

Availability of Hardware Technologies	Schools															Frequency	Percentage
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
SOFTWARE (MATERIALS)																	

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Computer Program	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	15	100%
Video Tapes		✓												✓		2	13%
Telecasts/Telecine	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	15	100%
Broadcast	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	13	87%
Tape Recording	✓				✓	✓				✓	✓	✓		✓	✓	8	53%
Transparencies	✓		✓	✓	✓		✓		✓	✓		✓			✓	6	40%
Movie Fims	✓		✓		✓		✓			✓		✓		✓	✓	3	20%
Slides	✓	✓								✓				✓	✓	5	33%
Filmstrips		✓			✓									✓	✓	4	27%
Frequency	**7**	**6**	**3**	**2**	**6**	**4**	**3**	**3**	**2**	**7**	**4**	**5**	**3**	**8**	**8**	**71**	**53%**

Data in the table reveal that computer and television (100%) are the only two (2) hardware technologies fully available in the 15 National Public High Schools of San Carlos City. Radio (87%) comes in next as available in 13 out of the 15 schools. All the other hardware technologies are not available in most of the 15 high schools in San Carlos City. This means most of the high schools are not equipped with hardware technologies essential to the efficient and effective implementation of the ICT program. This, in turn, hampers learning on the part of the students.

Similarly, data in the same table show that computer programs and telecasts/telecine (100%) are the only (2) software technologies fully available in the 15 schools. The rest of the software materials are not completely available to all the 15 school. Just line in hardware technologies, many high schools in San Carlos City lack software technologies.

This indicates that the ICT teachers in the different schools are in need of more hardware technologies and software materials in order to be able to teach effectively thereby enhancing the learning of the students in the subject of TLE.

As pointed out by Calderon (2005), the use of technologies can ensure learning more effective, meaningful and permanent. Thus the students can conceptualize the lesson better if there are appropriate technologies being utilized in teaching any subject.

Level of Technology Competencies of Teacher Respondents on the Different Domains of ICT

The level of Technology Competencies of Teacher Respondents Along the Different Domains of ICT are presented and described in the tables that follow:

Basic Computer Operation Skills

Table 7 presents the level of technology competencies of teacher respondents along the domain of basic computer operation skills.

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Table 7
Level of Technology Competencies of Teacher Respondents Along the Domain of Basic Computer Operation Skills (N=64)

INDICATORS	Very Competent (4)	Competent (3)	Somewhat Competent (2)	Not Competent (1)	Ave. Weighted mean	Descriptive Equivalent
a. Insert and eject floppy diskettes/usb	19 (76)	28 (84)	13 (26)	4 (4)	2.97	Competent
b. Store files in a folder / subdirectory	19 (76)	24 (72)	15 (30)	6 (6)	2.88	Competent
c. Access information on CD-ROM, floppy drive, and hard drive.	17 (68)	26 (78)	14 (28)	7 (7)	2.83	Competent
d. Create and delete folders / subsidirectories	18 (72)	24 (72)	19 (38)	3 (3)	2.89	Competent
e. Overall rating of basic computer operation skills	12 (48)	23 (69)	17 (34)	12 (12)	2.55	Competent
Overall Average Weighted Mean					**2.82**	**Competent**

It is apparent in the table that indicator number 1, Insert and eject floopy diskette has the highest average weighted mean of 2.97, followed by indicator number 4, Create and delete folders/subdirectories with an average weighted mean of 2.89 closely followed by indicator

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number 2, Store files in a folder/subdirectory with 2.88. The overall average weighted mean is 2.82. All the indicators are described as "Competent".

An analysis of the findings reveals that the teachers are skillful in the different technology competencies under the domain of basic computer operation skill. This means that they are capable of teaching well the basic computer operation skills.

According to Commission of Information and Communication Technology (2005), teachers need specialized competencies that enable them to use ICT hardware and software optimally in the fulfillment of their job functions.

Setup, Maintenance and Troubleshooting of Equipment

Table 8
Level of Technology Competencies of Teacher Respondents Along the Domain of Setup, Maintenance and Troubleshooting of Equipment
(N=64)

INDICATORS	Very Competent (4)	Competent (3)	Somewhat Competent (2)	Not Competent (1)	Ave. Weighted mean	Descriptive Equivalent
a. Protection of floppy diskettes / USB	8 (32)	17 (51)	29 (58)	10 (10)	2.36	Somewhat Competent
b. Virus protection	7 (28)	16 (48)	32 (64)	9 (9)	2.33	Somewhat Competent
c. Connecting peripheral devices	10 (40)	18 (54)	28 (56)	8 (8)	2.47	Somewhat Competent
d. Managing memory card	8 (32)	15 (45)	32 (64)	9 (9)	2.34	Somewhat Competent
e. Overall rating of ability to setup, maintain, and troubleshooting	7 (28)	16 (48)	27 (54)	14 (14)	2.25	Somewhat Competent

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equipment.						
Overall Average Weighted Mean					**2.35**	**Somewhat Competent**

Data in the table show that 5 indicators namely; Protection of floopy diskettes, virus protection, connecting peripheral devices, managing memory and over-all rating of ability to setup, maintain and troubleshoot equipment have average weighted mean of 2.36, 2.33, 2.47, 2.34 and 2.25 respectively. All the indicators have a common descriptive equivalent of "Somewhat Competent". The overall average weighted mean is 2.35 which indicate a descriptive rating of "Somewhat Competent".

Analysis of the findings indicates that the teachers are still deficient in the "know-how" along the domain on Setup, Maintenance and Troubleshooting of Equipment. This further indicates that they can only perform the indicated tasks with assistance. As such, they are not yet ready to handle and teach their students skills along this dimension.

Somyurek (2009) pointed out that teachers should not only be competent on the "know-how" of computer but also on the maintenance, and troubleshooting of equipment in order to prevent class interruptions and delay, thereby causing students to become off-task and essentially lose focus in the lesson.

Word Processing

Table 9
Level of Technology Competencies of Teacher Respondents Along the Domain of Word Processing
(N=64)

INDICATORS	Very Competent (4)	Competent (3)	Somewhat Competent (2)	Not Competent (1)	Ave. Weighted mean	Descriptive Equivalent
a. Set margins	27 (108)	20 (60)	15 (30)	2 (15)	3.33	Very Competent
b. Change font size and type	27 (108)	21 (63)	14 (18)	2 (2)	3.14	Competent
c. Cut, copy, and paste in and between documents	27 (108)	19 (57)	15 (30)	3 (3)	3.09	Competent
d. Insert, files, graphics,	25 (100)	21 (63)	17 (34)	1 (1)	3.09	Competent

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and tables in a document						
e. Overall rating of word processing ability	23 (92)	20 (60)	15 (30)	6 (6)	2.94	Competent
Overall Average Weighted Mean					**3.12**	**Competent**

Table 9 presents level of technology competencies of teacher respondents along the domain of word processing. It is evident in table 9 that indicator number 1, Set margins has the weighted average weighted mean of 3.31 which is describe as "Very Competent". Indicators 3 and 4, have a tie with a common average mean of 3.09 which is interpreted as "Competent". Indicator number 5, Overall rating of word processing ability has obtain 2.94 which has a descriptive equivalent of "Competent". The overall average weighted mean is 3.12 which means an equivalent rating of "Competent".

This implies that teachers have attained competencies and skills in word processing. This goes to show that they are already capable of handling and teaching the writing, editing and production of documents through the use of a computer program or system efficiently and effectively.

Spreadsheets

Table 10 presents level of technology competencies of teacher respondents along the domain of spreadsheets.

Table 10
Level of Technology Competencies of Teacher Respondents Along the Domain of Spreadsheets
(N=64)

INDICATORS	Very Competent (4)	Competent (3)	Somewhat Competent (2)	Not Competent (1)	Ave. Weighted mean	Descriptive Equivalent
a. Enter data in cells	22 (88)	20 (60)	15 (30)	7 (7)	2.89	Competent
b. Move data within a spreed sheet	21 (84)	22 (66)	16 (32)	5 (5)	2.92	Competent

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c. Use formulas	17 (68)	19 (57)	22 (44)	6 (6)	2.73	Competent
d. Create charts	18 (72)	18 (54)	16 (32)	12 (12)	2.66	Competent
e. Overall rating of spreadsheet management ability	17 (68)	18 (54)	17 (34)	12 (12)	2.63	Competent
Overall Average Weighted Mean					**2.77**	**Competent**

Data in table 10 reveal that indicator number 2, Move data within a spreadsheet has obtained an average weighted mean of 2.92 which is interpreted as "Competent" closely followed by indicator number 1, Enter data in cells which is described as "Competent".

The rest of the indicators 3, 4 and 5 which are Use formulas, Create charts, and Overall rating of spreadsheet management have obtained average weighted means of 2.73, 2.66 and 2.63 respectively. They are also described as "Competent". The overall average weighted mean of 2.77 indicates that the level of technology competencies of teacher respondents along the domain of spreadsheets is described as "Competent".

The findings imply that the teachers already possessed the skills of the domain of spreadsheets including creating spreadsheets with rows, columns and heading likewise graph from spreadsheets data. In other words, they are capable of performing interactive computer application programs for organization and analysis of data in tabular form.

Database

It refers to an organized collection of data or to data themselves and supporting data structures. Data are typically organized to model relevant aspects of reality in a way that supports processes requiring information.

Table 11 presents technology competencies of teacher respondents along the domain of database.

Table 11
Level of Technology Competencies of Teacher Respondents Along the Domain of Database
(N=64)

INDICATORS	Very Competent (4)	Competent (3)	Somewhat Competent (2)	Not Competent (1)	Ave. Weighted mean	Descriptive Equivalent
a. Enter data	9	15	30	10	2.36	Somewha

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in a data base	(36)	(45)	(60)	(10)		t Competent
b. Sort and Search in a database	8 (32)	16 (48)	27 (54)	13 (13)	2.30	Somewhat Competent
c. Produce a report in a database	8 (64)	14 (42)	27 (54)	15 (15)	2.73	Somewhat Competent
d. Queries using "and" and "or"	4 (16)	16 (48)	28 (56)	16 (16)	2.13	Somewhat Competent
e. Overall rating of competencies using a database.	4 (16)	17 (51)	28 (56)	15 (15)	2.16	Somewhat Competent
Overall Average Weighted Mean					**2.34**	**Somewhat Competent**

Data on table 11 reveal that indicator number 3, Produce a reporting in database has obtained an average mean of 2.73 which is interpreted as "Competent". However, indicators 1, 2 5 and 4 have a common descriptive equivalent of "Somewhat Competent" as evidenced by their average means of 2.36, 2.30, 2.16 and 2.13 respectively. The overall average weighted mean is 2.34 which is considered as "Somewhat Competent".

Analysis of the findings indicates that the teachers are still deficient in the different skills relative to this domain as evidence by the overall average weighted mean which is described as "Somewhat Competent". This means the teachers are not yet fully capable of organizing the collection of data and supporting data structures. They still need the help of others to be able to perform them.

Networking

Table 12 presents technology competencies of teacher respondents along the domain of Networking

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Table 12
Level of Technology Competencies of Teacher Respondents Along the Domain of Networking
(N=64)

INDICATORS	Very Competent (4)	Competent (3)	Somewhat Competent (2)	Not Competent (1)	Ave. Weighted mean	Descriptive Equivalent
a. Logging on a network	16 (64)	19 (57)	20 (40)	9 (9)	2.66	Competent
b. Working in a network environment	13 (52)	19 (57)	20 (40)	12 (12)	2.52	Competent
c. Electronic file sharing	12 (48)	13 (39)	25 (50)	14 (14)	2.36	Somewhat Competent
d. Knowledge of advantages of server	10 (40)	14 (42)	24 (48)	16 (16)	2.28	Somewhat Competent
e. Overall rating of networking skills	9 (36)	15 (45)	26 (52)	14 (14)	2.30	Somewhat Competent
Overall Average Weighted Mean					**2.42**	**Somewhat Competent**

It is evident in table 12 that indicators 1 and 2, which are logging on a network and working in a network environment are described as "Competent" as evidenced by their average weighted means of 2.66 and 2.52 respectively.

However, indicators 3, 4 and 5 namely: Electronic file sharing, Knowledge of advantages of server, and Overall rating of network skills have the obtained weighted mean of 2.36, 2.28 and 2.30 respectively. They have common descriptive equivalent of "Somewhat Competent". The overall average weighted mean of 2.42 is considered "Somewhat Competent".

Findings show that teachers do not yet fully possess the skills and competencies needed in the communication, design and use of a network including the physical (cabling, hub, bridges, router) the selection and use of telecommunication protocol and computer software including establishment of operation policies and procedures.

Telecommunication

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It refers to communication at a distance by technological means particularly through electrical signals or electromagnetic waves.

Table 13 presents the technology competencies of teacher respondents along the domain of telecommunication.

Table 13
Level of Technology Competencies of Teacher Respondents Along the Domain of Telecommunication
(N=64)

INDICATORS	Very Competent (4)	Competent (3)	Somewhat Competent (2)	Not Competent (1)	Ave. Weighted mean	Descriptive Equivalent
a. Send and receive E-mail	16 (60)	18 (54)	19 (38)	12 (12)	2.56	Competent
b. Navigate the WWW	17 (68)	17 (51)	17 (34)	13 (13)	2.59	Competent
c. Subscribe to a List-serve	13 (52)	14 (42)	24 (48)	13 (13)	2.42	Somewhat Competent
d. Develop programs using an authoring system or language	8 (32)	13 (39)	28 (56)	15 (15)	2.22	Somewhat Competent
e. Overall rating of telecommunication	9 (36)	15 (45)	29 (58)	11 (11)	2.34	Somewhat Competent
Overall Average Weighted Mean					**2.43**	**Somewhat Competent**

Data on table 13 reveal that the teacher respondents are competent along the indicators 2 and 1 which are: Send and receive E-mail and Navigate the WWW as evidenced by their average weighted means of 2.59 and 2.56 respectively. This means that they can complete and perform the tasks even without the support of other people.

However, indicators 3, 5 and 4, Subscribe to a list-serve, Develop programs using an

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authoring system or language and the overall rating of telecommunication are considered "Somewhat Competent" as evidenced by their weighted means of 2.42, 2.34 and 2.22 respectively. In other words, they are still deficient along these indicators of telecommunication. The overall average mean of 2.43 is interpreted as "Somewhat Competent".

This goes to show that the teachers, as a whole, are not yet fully equipped with the competencies needed for communication at a distance by technological means.

It is similar to what Abad (2004) pointed out that most of the teachers lack competencies and skills in the use of internet particularly in developing programs, subscribing including doing online research.

Media Communication

Table 14 presents technology competencies of teacher respondents along the domain of medic communication.

Table 14
Level of Technology Competencies of Teacher Respondents Along the Domain of Media Communication (N=64)

INDICATORS	Very Competent (4)	Competent (3)	Somewhat Competent (2)	Not Competent (1)	Ave. Weighted mean	Descriptive Equivalent
a. Use an overhead projector	13 (52)	18 (54)	20 (40)	13 (13)	2.48	Somewhat Competent
b. Develop an electronic slide show	10 (40)	13 (39)	27 (54)	14 (14)	2.30	Somewhat Competent
c. Develop an interactive electronic slide show	9 (36)	14 (42)	29 (58)	12 (12)	2.31	Somewhat Competent
d. Develop a presentation utilizing graphics and sound	13 (52)	15 (45)	24 (48)	12 (12)	2.45	Somewhat Competent
e. Overall rating of media communication skills	11 (44)	16 (48)	24 (48)	13 (13)	2.39	Somewhat Competent

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Overall Average Weighted Mean					**2.39**	**Somewhat Competent**

Data on table 14 reveal that indicator number 1, Use an overhead has obtained an average weighted mean of 2.48 closely followed by indicator number 4, Develop a presentation utilizing graphics and sound with an average weighted mean of 2.45.

Similarly, indicators 5, 3 and 2 which are: Overall rating of media communication skills, Develop an interaction electronic slide show and Develop an electronic slide show have average weighted means of 2.39, 2.31 and 2.30 respectively. All the 5 indicators are described as "Somewhat Competent".

The overall average weighted mean is 2.39 which is also described as "Somewhat Competent". This means that the teacher still lack skills and competencies in all tasks under this domain.

In other words, the teacher respondents are not yet fully capable of performing task relative to interchanging, transmitting and receiving information.

Social, Legal and Ethical Issues

Table 15 presents technology competencies of teacher respondents along the domain of social, legal and ethical issues.

Table 15
Level of Technology Competencies of Teacher Respondents Along the Domain of Social, Legal and Ethical Issues
(N=64)

INDICATORS	Very Competent (4)	Competent (3)	Somewhat Competent (2)	Not Competent (1)	Ave. Weighted mean	Descriptive Equivalent
a. Knowledge of copyright laws	6 (24)	17 (51)	25 (50)	16 ( )	2.20	Somewhat Competent
b. Knowledge of concerning shareware	4 (16)	18 (54)	26 (52)	16 (16)	2.16	Somewhat Competent
c. Knowledge of software piracy	4 (16)	20 (60)	24 (48)	16 (16)	2.19	Somewhat Competent
d. Knowledge of intellectual	5 (20)	20 (60)	25 (50)	14 (14)	2.25	Somewhat Competen

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property rights						t
e. Overall rating of social, legal and ethical issues	4 (16)	18 (54)	28 (56)	14 (14)	2.19	Somewhat Competent
Overall Average Weighted Mean					**2.20**	**Somewhat Competent**

It is evident in table 15 that indicators 4, 3, 5, 1 and 2 namely: Knowledge of intellectual property rights, knowledge of software piracy, Overall rating of social, legal and ethical issues, Knowledge copyright laws and knowledge concerning shareware are all described as "Somewhat Competent". They have an average weighted mean of 2.20 which is interpreted as "Somewhat Competent".

This implies that the teacher respondents lack technology knowledge under this domain of social, legal and ethical issues. This means that, an in all, teachers do not have sufficient knowledge on social, legal and ethical issues that affect information communication and technology.

Summary on the Level of Technology Competencies of Teacher Respondents in the Different Domains of ICT

Data in table 16 reveal that the overall average weighted means of nine (9) dimensions of ICT ranges from 2.20 to 3.12. Data on the same table also show that the top (3) dimensions of ICT are: Word Processing (3.12), Basic Computer Operation Skills (2.82) and Spreadsheets (2.77). These are described as "Competent".

Table 16
Summary on the Level of Technology Competencies of Teacher Respondents in the Different Domains of ICT

Domain of ICT	Overall AWM	Descriptive Method
1. Basic Computer Operation Skills	2.82	Competent
2. Setup, Maintenance and Troubleshooting	2.35	Somewhat Competent
3. Word Processing	3.12	Competent
4. Spreadsheet	2.77	Competent
5. Database	2.34	Somewhat Competent
6. Networking	2.42	Somewhat Competent
7. Telecommunication	2.43	Somewhat Competent
8. Media Communication	2.39	Somewhat Competent
9. Social, Legal and Ethical Issues	2.20	Somewhat Competent

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Grand AWM	2.54	Competent

However, the lowest 3 dimensions are: Social, Legal and Ethical Values (2.20), Setup, Maintenance and Troubleshooting of Equipment (2.35) and Media Communication (2.39) with a common descriptive rating of "Somewhat Competent". The grand mean is 2.54 described as "Competent".

Findings reveal that the ICT teachers are generally competent in the different domains of ICT. However, it must be mentioned that these are domains they still lack the needed skills and competencies to be able to teach efficiently and effectively.

Differences Between Teachers' Level of Technology Competencies and their Profile Variables

Age

Table 17 shows the differences between teachers' level of teaching competencies according to age.

Table 17
Differences Between Teachers' Level of Technology Competencies According to Age

Domain of ICT	AGE					
	22-39 years		40-59 years		60 years and above	
	AWM	DE	AWM	DE	AWM	DE
1. Basic Computer Operation Skills	2.86	Competent	2.83	Competent	2.77	Competent
2. Setup, Maintenance and Troubleshooting	2.41	Somewhat Competent	2.38	Somewhat Competent	2.26	Somewhat Competent
3. Word Processing	3.16	Competent	3.10	Competent	3.10	Competent
4. Spreadsheet	3.01	Competent	2.96	Competent	2.34	Competent
5. Database	2.42	Somewhat Competent	2.40	Somewhat Competent	2.20	Somewhat Competent
6. Networking	2.46	Somewhat Competent	2.41	Somewhat Competent	2.39	Somewhat Competent
7. Telecommunication	2.48	Somewhat Competent	2.42	Somewhat Competent	2.39	Somewhat Competent
8. Media Communication	2.46	Somewhat Competent	2.41	Somewhat Competent	2.30	Somewhat Competent
9. Social, Legal and Ethical Issues	2.35	Somewhat Competent	2.28	Somewhat Competent	1.97	Somewhat Competent
Overall Average Weighted Mean	**2.62**	**Competent**	**2.58**	**Competent**	**2.41**	**Competent**

Computed F-value : 0.92
F – value for A vs B = 0.59
F – value for A vs C = 1.63
F – value for B vs C = 1.07

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Critical value: 3.40, Alpha = 5% level
Decision: Accept
Interpretation: Not Significant

Data in table 17 show the level of technology competencies of teachers in the nine (9) domains categorized, according to different age brackets namely: 22 – 39, 40 – 59 and 60 and above.

The computed F-value and the critical value at the .05 level are likewise shown in the table. As shown, the computed F-value is 0.92 and the control value is 3.40. Since the critical value is greater than the F-value, the hypothesis is accepted. This means that there are no significant differences between the teachers' technology competencies and their age classifications. It can therefore be inferred that age did not affect or influence the level of technology competencies of teaches all the domains of the ICT. This means that the technology competencies of teachers, whether young or old, is on the same level.

Educational Attainment Related to ICT

Table 18 presents the level of technology competencies of teachers according to educational attainment related to ICT.

Table 18
Differences Between Teachers' Level of Technology Competencies According to Educational Attainment Related to ICT

Domain of ICT	Educational Attainment			
	With ICT Background (N=28)		Without ICT Background (N=36)	
	AWM	DE	AWM	DE
1. Basic Computer Operation Skills	3.35	Very Competent	2.29	Somewhat Competent
2. Setup, Maintenance and Troubleshooting	3.21	Competent	1.49	Not Competent
3. Word Processing	3.28	Very Competent	2.96	Competent
4. Spreadsheet	3.12	Competent	2.42	Somewhat Competent
5. Database	2.86	Competent	1.82	Somewhat Competent
6. Networking	2.58	Competent	2.26	Somewhat Competent
7. Telecommunication	2.54	Competent	2.32	Somewhat Competent
8. Media Communication	2.47	Somewhat Competent	2.31	Somewhat Competent

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9. Social, Legal and Ethical Issues	2.36	Somewhat Competent	2.04	Somewhat Competent
Overall Average Weighted Mean	2.86	**Competent**	**2.21**	**Somewhat Competent**

Computed t-value : 3.48
Critical value : 2.12
Alpha ; .05
Decision : Reject
Interpretation : Significant

Data on table 18 reveal the level of technology competencies of teachers in the nine (9) domains and their educational attainment related to ICT. The computed t-value and the critical value at the .05 level are also shown. The computations show that the critical value of 2.12 is lesser that the computed value of 3.48. This means that the null hypothesis is rejected. This indicates that there are significant differences between the level of technology competencies and educational attainment related to ICT. It may be inferred that teaches with ICT background are more competent that those without ICT background.

Years of Teaching Experience

Table 19 show the differences between the level of technology competencies of teachers and their years of teaching experience.

Table 19
Differences Between the Teachers' Level of Technology Competencies According to Number of Years of Teaching Experience

Domain of ICT	Years of Teaching Experience					
	0-7 years (N=18) A		8-15 years (N=22) B		16 years and above (N=24) C	
	AWM	DE	AWM	DE	AWM	DE
1. Basic Computer Operation Skills	2.89	Competent	2.85	Competent	2.72	Competent
2. Setup, Maintenance and Troubleshooting	2.40	Somewhat Competent	2.38	Somewhat Competent	2.27	Somewhat Competent
3. Word Processing	3.18	Competent	3.10	Competent	3.08	Competent
4. Spreadsheet	2.90	Competent	2.88	Competent	2.53	Competent
5. Database	2.60	Competent	2.42	Somewhat Competent	2.00	Somewhat Competent
6. Networking	2.44	Somewhat Competent	2.43	Somewhat Competent	2.39	Somewhat Competent
7. Telecommunication	2.47	Somewhat Competent	2.45	Somewhat Competent	2.37	Somewhat Competent
8. Media Communication	2.44	Somewhat Competent	2.46	Somewhat Competent	2.27	Somewhat Competent
9. Social, Legal and	2.34	Somewhat	2.37	Somewhat	1.89	Somewhat

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Ethical Issues		Competent		Competent		Competent
Overall Average Weighted Mean	**2.63**	**Competent**	**2.59**	**Competent**	**2.39**	**Competent**

Computed F – value : 1.58
F – value for A vs B = .076
F – value for A vs C = 2.74
F – value for B vs C = 1.91
Critical Value: 3.40 Alpha: 5% level
Decision: Accept
Interpretation: Not Significant

Table 19 shows the level of technology competencies of teachers in the nine (9) domains of ICT and their year of teaching experiences. The same table also gives the computed F-value and the critical value at the .05 level.

The computations show that the critical value of 3.40 is greater than the F-value of 1.58. This means the null hypothesis is accepted. This indicates that there are no significant differences between the level of technology competencies of teachers and their years of teaching experiences. This shows that those who are young in the service are as competent as the more experience and older ones in the service.

Attendance in ICT Seminars

Table 20 shows the differences between the teachers' level of technology competencies in the nine (9) areas and their attendance in ICT seminars/trainings.

Table 20
Differences Between Teachers Level of Technology Competencies According to Seminars/Training Attended in ICT

Domain of ICT	Seminars / Training Attended					
	1-2		3-4		5 and above	
	AWM	DE	AWM	DE	AWM	DE
1. Basic Computer Operation Skills	2.74	Competent	2.84	Competent	2.88	Competent
2. Setup, Maintenance and Troubleshooting	2.30	Somewhat Competent	2.35	Somewhat Competent	2.40	Somewhat Competent
3. Word Processing	3.03	Competent	3.14	Competent	3.19	Competent
4. Spreadsheet	2.61	Competent	2.84	Competent	2.86	Competent
5. Database	2.11	Somewhat Competent	2.43	Somewhat Competent	2.48	Somewhat Competent
6. Networking	2.40	Somewhat Competent	2.40	Somewhat Competent	2.46	Somewhat Competent
7. Telecommunication	2.43	Somewhat Competent	2.42	Somewhat Competent	2.44	Somewhat Competent

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8. Media Communication	2.32	Somewhat Competent	2.41	Somewhat Competent	2.44	Somewhat Competent
9. Social, Legal and Ethical Issues	2.07	Somewhat Competent	2.24	Somewhat Competent	2.29	Somewhat Competent
Overall Average Weighted Mean	**2.45**	**Somewhat Competent**	**2.56**	**Competent**	**2.60**	**Competent**

Computed F-value= 0.72
F-value for A vs B= .605
F-value for A vs C= 1.125
F-value for B vs C= 0.08
Critical value : 3.40
Decision : Accept
Interpretation : Not Significant

The computed F – value and the critical value at the .05 level are also show in the table. Findings show that the critical value of 3.40 is greater than the F-value of 0.72. This implies that the null hypothesis is accepted. This means that there are no significant differences between the teachers' level of technology competencies and their attendance in seminars/trainings. This shows that the number of attendance in ICT seminars/trainings did not affect the teachers' level of technology competencies in ICT. As such, those who attended more seminars/trainings were not more competent than those who attended less seminars/trainings. In the same manger, those who attended less were not less competent than those who attended more.

Strengths and Needs of Teaches in the Different Domains of ICT

Table 21 shows the strengths and needs of teachers along the different domains of ICT.

Table 21
Strengths and Needs of Respondent Teachers in the Different Domains of ICT
(N=64)

Technology Competencies Domains / Indicators	Strengths	Needs
1. Basic Computer Operation Skills		
a. Insert and eject floppy diskettes/usb	2.97	
b. Store files in a folder / subdirectory	2.88	
c. Access information on CD-ROM, floppy drive, and hard drive.	2.83	
d. Create and delete folders / subsidirectories		1.89
e. Overall rating of basic computer operation skills	2.55	
2. Setup, Maintenance and Trouble shooting of Equipment		
a. Protection of floppy diskettes / USB		2.36

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b. Virus protection		2.33
c. Connecting peripheral devices		2.47
d. Managing memory card		2.34
e. Overall rating of ability to setup, maintain, and troubleshooting equipment.		2.25
3. Word Processing		
a. Set margins	3.33	
b. Change font size and type	3.14	
c. Cut, copy, and paste in and between documents	3.09	
d. Insert, files, graphics, and tables in a document	3.09	
e. Overall rating of word processing ability	2.94	
4. Spreadsheets		
a. Enter data in cells	2.89	
b. Move data within a spreed sheet	2.92	
c. Use formulas	2.73	
d. Create charts	2.66	
e. Overall rating of spreadsheet management ability	2.63	
5. Database		
a. Enter data in a data base		2.36
b. Sort and Search in a database		2.30
c. Produce a report in a database	2.73	
d. Queries using “and” and “or”		2.13
e. Overall rating of competencies using a database.		2.16
6. Networking		
a. Logging on a network	2.66	
b. Working in a network environment	2.52	
c. Electronic file sharing		2.36
d. Knowledge of advantages of server		2.28
e. Overall rating of networking skills		2.30
7. Telecommunication		
a. Send and receive E-mail	2.56	
b. Navigate the WWW	2.59	
c. Subscribe to a List-serve		2.42
d. Develop programs using an authoring		2.22

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system or language		
e. Overall rating of telecommunication		2.34
8. Media Communication		
a. Use an overhead projector		2.48
b. Develop an electronic slide show		2.30
c. Develop an interactive electronic slide show		2.31
d. Develop a presentation utilizing graphics and sound		2.45
e. Overall rating of media communication skills		2.39
9. Social, Legal and Ethical issues		
a. Knowledge of copyright laws		2.20
b. Knowledge of concerning shareware		2.16
c. Knowledge of software piracy		2.19
d. Knowledge of intellectual property rights		2.25
e. Overall rating of social, legal and ethical issues		2.19

It is evident in table 21 that there are lesser strengths (20) than weaknesses (25) of teachers along the nine dimensions of ICT. The top five strengths are on set margins (3.33) Change font size and type (3.14) Insert, files, graphics and tables in a document (3.09), Cut, Copy and Paste in and between documents (3.09) and Insert and eject floppy diskette (2.97). However, the lowest five needs are: Queries using "and" and "or" (2.13), Overall rating of competencies using a database (2.16), Knowledge concerning shareware (2.16), Overall rating of social, legal and ethical issues (2.19) and knowledge of software piracy (2.19).

Knowledge concerning software piracy, shareware and other concerns for social, legal and ethical issues as one domain of technology competencies of teachers can not be underestimated. There is a felt need of teachers to be well equipped along this domain of technology competencies. In the same manner, that teachers should also be competent in the domain of database including technology competencies in the other domains like Setup, Maintenance and Troubleshooting of Equipment, Networking, Telecommunication and media Communication in order to make them proficient in the field of ICT.

Problems Encountered by Teacher Respondents in Teaching ICT

Table 22 presents the seriousness of problems encountered in the teaching of ICT.

Data gathered reveal that the top five serious problems are: Lack of funds in the provision of technologies, Lack of "Know-how" in the use of the different technologies, Lack of training in the preparation, maintenance and troubleshooting of equipment, Lack of support by the authorities and other linkages in the provision of the different technologies and Poor quality of technologies produced and distributed. They have average weighted mean of 2.47, 2.44, 2.41, 2.39 and 2.38 respectively.

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Table 22
Seriousness of Problems Encountered by the Teacher Respondents in Teaching ICT
(N=64)

Indicators	Degree of Seriousness of Problems		
	Average Weighted Mean	Descriptive Equivalent (DE)	Rank
1. Lack of training in the preparation, maintenance and troubleshooting of equipment.	2.41	Serious	3
2. Poor quality of technologies produced and distributed.	2.38	Serious	5
3. Lack of resource persons to initiative training and staff development relative to utilization of the different technologies	2.16	Moderately Serious	10
4. Some instructional technologies are already defective.	2.34	Serious	8
5. Lack of "know-how" in the use of different technologies	2.44	Serious	2
6. Limited chance and opportunities to be tapped or selected as participants in the training on technology.	2.36	Serious	6.5
7. Lack of funds in the provision of technologies	2.47	Serious	1
8. Disparity in the distributions of technologies by the concerned authorities	2.36	Serious	6.5
9. Lack of support by the authorities and other linkages in the provision of the different technologies.	2.39	Serious	4
10. Low level of safety awareness.	2.31	Moderately Serious	9
Overall Average Weighted Mean	**2.36**	**Serious**	

However, two (2) of the ten (10) indicators are only classified as "Moderately serious". These are indicators 3 and 10 namely: Lack of resource persons to initiate training and staff development relative to utilization of the different technologies and Low level of safety awareness. They have obtained average weighted means of 2.16 and 2.31 respectively. The overall average weighted mean is 2.36 which is described as "Serious".

Further analysis of the data shows that funding, training, lack of support by the authorities, poor quality of technologies and lack of "know-how" which are described as serious can greatly affect the competencies of teaching in teaching ICT.

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Proposed Action Plan Along Training Program

Based on the identified strengths and needs including the degree of seriousness of problems encountered, the proposed plan of action along training program is designed.

In designing said plan, special focus was given to areas that require immediate attention because of their significance in enhancing teachers' level of technology competencies along the different domains of ICT.

The proposed action plan has the following components:

1. Areas of Concern
2. Targets
3. Activities / Strategies
4. Time Frame
5. Person / Agencies Involved
6. Budget Estimate
7. Success Indicator

The proposed action plan in presented in tabular form in the pages that follow:

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Proposed Action Plan to Improve the Level of Technology Competencies of Teachers Along the Nine (9) Domains of ICT

Areas of Concern	Targets / Objectives	Activities / Strategies	Time Frame	Persons / Agencies Involved	Budget Estimate	Success Indicator
A. Profile of the Respondent Teachers						
1. Educational Attainment Related to ICT	Update the educational attainment of teachers particularly in ICT	Encourage to attend and finish degree related to ICT. Asking the DepEd to maximize giving of scholarship grants to teachers enrolled in ICT.	Year Round	Regional Director Schools Division Superintendent Principals Teachers		80% of the teachers shall have finished degree related to ICT.
2. Seminars / Training attended in ICT	Maximize the attendance of teachers in seminars / training in ICT	Encourage teachers to attend seminars / trainings related to ICT To request DepEd shoulder the registration fees of teachers in attending seminars / trainings related to ICT.	Year Round	Principals Teachers	P5,000	85% of the teachers shall have maximized trainings / seminars related to ICT.

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B. Domains of ICT						
1. Basic Computer Operations Skills	To improve teachers' competencies in basic computer skills.	Attend short term course related to computer operation.	Summer Break Saturday Classes	Teachers	P10,000	95% of the teachers shall have improved their competencies in basic computer skills.
2. Setup, Maintenance and Troubleshooting of Equipment	To equip teachers about protection of floppy diskettes, virus protection, connecting peripheral devices, managing memory including ability to set-up, maintain and troubleshoot equipment	Attend division training on the areas / indicators along the identified domain.	Semestral Break	Division Personnel Principal Teachers	P15,000	85% of the teachers shall have equipped with the aforementioned areas / indicators including ability to setup, maintain and troubleshoot equipment.
3. Word Processing	To gain teachers 'know-how" of word processing which also includes setting of margins, cutting, copying and pasting in and between	Conduct training and lecture on word processing	During Saturday and Sunday	Principal Teachers Resource Person		90% of the teacher shall have gained "Know-how" word processing including the identified areas.

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	documents and changing font size and type.					
4. Spreadsheets	To improve teachers' competency relative to enter data in cells, move data within a spreadsheets management ability	Initiate training and forum concerning spreadsheets management	Semestral break (3-day training)	Division Supervisor Principal Teachers LGU	P30,000	85% of the teachers shall have improve their competencies along the domain of spreadsheets.
5. Database	To equip teachers enter data, sort and search and produce a report in database.	Conduct training and lecture on the proper use of database	Summer Break (2-day training of database)	Principal Teachers Resource Person	P12,000	85% of the teacher shall have equipped with the proper use of database.
6. Networking	To gain teachers meaningful insight understanding, and skills concerning networking including logging on a network environment, electronic file sharing and knowledge of advantages	Attend LAC session on networking management	Saturday and Sunday	Principal Teachers Resource Person	P5,000	85% of the teachers shall have gained insight, understanding and skills concerning networking.

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	of server.					
7. Telecommunication	To improve teachers' abilities on sending and receiving	Attend division training on Telecom-munication	Summer Break	Division Supervisor Principal Teacher	P15,000	90% of the teachers shall have improved their abilities relative to areas / indicators along Telecommunication
8. Media Communication	To equip teachers on using overhead, developing an interactive electronic slideshow and a presentation utilizing graphics and sound asides from skills in media communication.	Attend division training on Media com-munication management	Summer Break	Teachers	P5,000	90% of the teachers shall have equipped with the identified areas / indicators on media communication
9. Social, Legal and Ethical Issues	To acquire teachers' knowledge and concepts about copyright laws, shareware software piracy and intellectual property rights.	Attend lecture and forum on social, legal and ethical issues	Saturday and Sunday	Teachers Principal	P4,500	85% of the teachers shall have acquired knowledge and concepts on the aforementioned indicators.

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C. Seriousness of Problems Encountered						
1. Lack of funds in the provision of technologies both hardware and software.	To provide funds in the provision of technologies.	To engage in the different activities. a. solicitation b. school fund raising campaign c. asking donations from the successful alumni and other services	Year round	Teachers Internal and External Stake-holders	P200,000	90% of the amount for the budget estimate shall be provided by the teachers.
2. Lack of "Know-how" in the use of the different technologies.	Teachers should be equipped with the "know-how" in the use of the different hardware and software technologies.	Thru holding of seminars-workshops	Year round	Principal Teachers Resource persons	P40,000P	90% of the teachers shall equipped with the "know-how" in the use of different technologies.
3. Lack of training in the preparation, maintenance and troubleshooting of equipment.	Teachers should undergo training in the preparation, maintenance and troubleshoo	Conducting seminars – workshop	April - May	Division Personnel Principal Teachers	P25,000	95% of the teachers shall have trained in the preparation, maintenance and troubleshooting of

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	ting of equipment.					equipment.
4. Recruitment of teacher with ICT background	To recruit teachers with ICT background	Conducting information dissemination campaign on needs of school/institution preferably with ICT background. Submit specialized skills related to ICT. Skills are to be validated through practicum	April - May	Division Personnel Principal Ranking Committee Teacher - Applicants		Recruitment of teachers with ICT background shall have manifested with 90% success.

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IV. SUMMARY, CONCLUSION and RECOMMENDATION

This chapter presents the re-statement of the research problems which was the focus of this study, summary of salient findings, conclusions and recommendations which are primarily based on the findings.

Re-Statement of the Problem

The study sought to determine the status of Information Communication Technology Instruction in Public Secondary Schools in the City of San Carlos, Pangasinan during the school year 2025 – 2026 in terms of teachers' profile, availability of hardware and software technologies, level of technology competencies in nine (9) domains of ICT strengths and needs of teachers in teaching ICT and the problems encountered.

The respondents consisted of 64 TLE teachers teaching ICT in the Ramon Magsaysay National High School, Manila.

Findings

The salient findings of the study are as follows:

1. Most of the teachers are within the age bracket from 22-39 years, do not have background in ICT, have attended seminars/training for 3-4 times for the last 2 years are been in the service for 8 years or more.
2. Only computer and television are available under hardware technologies and computer programs and telecasts/telecine under software technologies are fully available to all the 15 school.
3. The level of teachers' technology competencies in the domains of Basic Computer Operation Skills, Word Processing, Spread sheets are describe as "Competent". The other ICT domains namely: Setup, Maintenance and Troubleshooting of Equipment, Database, Networking, Telecommunication, Media Communication and Social, Legal and Ethical Issues are describe as "Somewhat Competent".
4. With the exception of educational attainment related to ICT, no significant differences between teachers' technology competencies and age, length of service and attendance in seminars/training were found to exist.
5. There are strengths and needs of teachers along the nine (9) domains of ICT. In some areas, there are more needs than strengths.
6. The most serious problems encountered by teachers are lack of funds in the provision of technologies, lack of "know-how" in the use of the different technologies and lack of training in the preparation, maintenance and troubleshooting of equipment.
7. A proposed plan of action to improve the level of technology competencies of teachers can be formulated.

Conclusions

Based on the findings, the following conclusions, were drawn.

1. Most of the teachers are not fully prepared and equipped in performing the needed tasks in the different domains of ICT.
2. Most of the hardware machines and software materials are not available.
3. The teachers still lack the competencies in most domains of ICT.

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4. The perceptions of teachers on the level of technology competencies when grouped according to their identified profile variables are similar.
5. The needs of teachers overshadow or dominate their strengths.
6. The ICT teachers are confronted with problems that hinder them in the efficient and effectively delivery of ICT instruction.
7. The proposed plan of action which was formulated enhances the strengths and fully addresses the needs of teachers along the nine (9) domains of ICT.

Recommendations

Based on the findings and conclusions of the study, the following recommendation is forwarded.

1. A proposed plan of action that is formulated by presented to the Schools Division Superintendent for adoption and implementation.

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