Computer Literacy of Non-Information Technology Students: Basis for Curriculum Enhancement

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Abstract— *This paper adopted the descriptive method of research. The researcher used questionnaires to gather data together with interview and observation. The interview technique was used to validate data that has been gathered in the questionnaires. The aim of the study was to determine the level of computer literacy of non-information technology students. The study involved the third year non-information technology students in the different campuses of Nueva Ecija University of Science and Technology during the first semester school year 2012-2013.*

The findings disclosed that students of non-information technology courses have moderate computer literacy, especially in some complex applications, operating and information systems.

Keywords— *Digital Literacy, computer literacy, students, computer education.*

I. INTRODUCTION

The precise definition of computer literacy can vary from group to group. Generally, literate connotes one who can read any arbitrary book in their native languages, looking up new words as they are exposed to them. Likewise, an experienced computer professional may consider the ability to self - teach to be central to computer literacy. In common discourse, however, computer literacy often connotes little more than the ability to use several very specific applications (usually Microsoft word, Microsoft Internet Explorer, and Microsoft Outlook) for certain very well - defined simple tasks, largely by rote. [1]

The pervasiveness of computers continues to grow at an outstanding rate. Computers always change; they become smaller, faster and more powerful. These changes have motivated modern society to become comfortable with basic computer - related skills.

Computer Literacy is considered to be a very important skill to possess while in the first world. 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 for writing, especially among youth. For many applications - especially communicating- computers

are preferred over a pen, paper, and typewriters because of their ability to duplicate and retain information and ease of editing. As personal computers become commonplace and they become more powerful, the concept of computer literacy is moving beyond basic functionality to more powerful applications under the heading of literacy. [2]

Computer literacy is an important skill expected for fresh graduates. This study focuses on evaluating the computer literacy rate of non-IT courses. The goal is to evaluate the computer literacy of respondents based on different computer skills normally used in the workplace.

The study aims to provide insights into the curriculum development office on what computer literacy topics to include or update to ensure all graduates are considered computer literate. Factors like curriculum, secondary school background, access to computer and computer awareness that can affect the respondents are also evaluated.

Hall (2003) noted that to staff the libraries of the 21st century, to manage and control our information-rich environment we need staff with sophisticated technical skills. Workplace nowadays uses digital devices like desktop computers, laptops, printers, photocopiers to support their operations. Information systems are also used to support business processes. It is important that workers have the knowledge to operate these systems. Colleges and universities, on the other hand, must do their share by providing students the curriculum that meets what the expectation of the industry in a computer literate graduate.

II. METHODOLOGY

The study used a descriptive method of research. [3] The researcher used questionnaires to gather data together with interview and observation. The interview technique was used to validate data that has been gathered in the questionnaires. The aim of the study was to determine the level of computer literacy of non-information technology students. The study involved the third year non-information technology students in the different campuses of Nueva Ecija University of Science and Technology during the first semester school year 2012-2013.

Curriculum	F	%
Revised Secondary School Curriculum	244	93.1
Special Program for Arts	2	.8
Special Program for Sports	3	1.1
Special Program for Information and Communication Technology	3	1.1
Special Science Curriculum	10	3.8
Total	262	100.0

Table 4: Course Distribution of Respondents

Secondary School Background

In terms of secondary school background, the table shows that majority of the respondents come from public schools, 213 or 81.3, and 40 or 18.7% come from private schools.

The public schools have computers available for their students because of the Department of Education Computerization program wherein all high schools have at least 10 units of computer.

School Type	F	%
Public	213	81.3
Private	49	18.7
Total	262	100.0

Table 5: Secondary School Background

Curriculum

For the curriculum, 244 or 93.1% were into a revised secondary school curriculum of DepEd, because based on the previous discussion in secondary school background, majority of the respondents come from public schools. Ten or 3.8% respondents were in Special Science Curriculum, 3 or 3.11% from Special Program for Information and Communication Technology, another 3 or 3.11% from Special Programs for Sports, and 2 or .8% from Special Programs for Arts.

Students from different curriculum had different opportunities to use the computer in high school. Those students from Special Science Curriculum have separate computer subject in lieu of Technology and Livelihood Education.

Students from Special Program for Information and Communication Technology can be said that they have sufficient available computers for their students. The curriculum used by this program needs students to have

III.   RESULTS AND DISCUSSIONS

Profile of the Respondents

The profile of the respondents were discussed and presented in this section.

Age

Majority of the respondents are in between 19-21 years of age

Table 2: Age Distribution of the respondents

Age	F	%
16-18	117	44.66
19-21	126	48.09
22-24	12	4.58
25-27	5	1.91
28-30	1	0.38
31-33	1	0.38
Total	262	100.00

Gender

The table shows that majority of the respondents who were enrolled in the non-information technology courses were females. This can be attributed to the courses being studied, which were: Business Administration, Bachelor of Science in Secondary Education, and Bachelor of Science in Elementary Education, which was believed to be courses dominated by females or women.

Table 3: Gender distribution of Respondents

Gender	F	%
Male	71	27.1
Female	191	72.9
Total	262	100.0

Course

As to the course of the respondents, majority enrolled in Bachelor of Science in Business Administration, 126 or 48.1%; the second course is Bachelor of Science in elementary Education, 91 or 34.7%; and 45 or 17.2% were enrolled in Bachelor of Science in Secondary Education. These courses have only basic information technology subjects in the first year level. They only receives simple and not complex information curriculum.

Course	F	%
Bachelor of Science in Business Administration	126	48.1
Bachelor of Science in Elementary Education	91	34.7
Bachelor of Science In Secondary Education	45	17.2
Total	262	100.0

their own computers in their laboratory for their hands-on experiences.

Table 6. Curriculum

Curriculum	F	%
Revised Secondary School Curriculum	244	93.1
Special Program for Arts	2	.8
Special Program for Sports	3	1.1
Special Program for Information and Communication Technology	3	1.1
Special Science Curriculum	10	3.8
Total	262	100.0

Access to Computer

In access to desktop computer, the table shows that 241 of the respondents have access on desktop computers. Others in digital camera, 234; and also in laptop computers, 226. The respondents have presentation software installed in their computers, 183; and others have an internet access in their schools. One hundred fifty eight of them (158) have laser printers and 81 have a full page scanner that they can use in their assignments and other activities in school.

This result indicates that the respondents are exposed to technology especially with the use of computers and other gadgets. Nowadays, you can have easy access to computers whether it is in the school or outside the school. Having access to computer is not a problem anymore because there are establishments offering the use of computers as well as internet services and other technology related gadgets, at a very minimal amount affordable to people in all walks of life.

Table 7: Access to Computer

Access To	F	%
Digital Camera	234	89.3
Full Page Scanner	81	30.9
Laser Printer	158	60.3
Desktop Computer	241	92.0
Laptop Computer	226	86.3
Presentation Software	183	69.8
Internet in the High School	179	68.3

Level of the Students' Computer Literacy

The results of the findings on the level of students' computer literacy is presented and discussed in this portion.

Awareness in Computer

Table 8 presents the level of awareness of the respondents in computer literacy.

Table 8: Awareness of Respondents in Computer

Level	Range	F	%
High	27 - 35	84	32.06
Moderate	17 - 26	176	67.18
Low	7 -16	2	0.76
Total		262	100.00

As seen on the table, it shows that majority of the respondents are moderately aware on the use of computer. Though in the previous discussion, majority of the respondents showed they have access on desktop computers, they do not have the knowledge on how to use or operate it.

Eighty four (84 or 32.06%) showed high awareness in computer literacy; this is because some of them owned laptops and have access on computers.

The results indicated that the level of awareness on computer literacy of the respondents is moderate because majority of the respondents came from public schools. In some public schools, especially those in the rural areas, they could not follow the standard curriculum because of lack of computers to be used by their students. They could not teach them by using their imaginations only because computers are very highly technical subjects that need students to have hands-on practice. This hinders them acquire knowledge to use and operate it.

Basic Computer Literacy

The responses of the respondents on their basic computer literacy were discussed and presented in Table 9.

Generally speaking, the respondents agreed that they know how to use computers.

Table 9: Basic Computer Literacy of the Respondents

	Computer Literacy	Weighted Mean	Verbal Description
1	I have a basic knowledge of computers.	4.37	Strongly Agree
2	I have avoided computers because they are unfamiliar to me.	1.90	Disagree
3	I have a working knowledge of computer terminology	3.44	Agree
4	I understand the technical aspects of computers.	3.42	Agree
5	I feel secure about my ability to interpret a computer manual.	3.36	Agree
6	I feel confident about using computers	3.97	Agree
7	I know there are different Internet research tools (Google, Yahoo, etc.) available to use.	4.65	Strongly Agree

The respondents strongly agreed that they have the basic knowledge on how to use computers. These were proven by the weighted mean obtained by the following statements: I know there are different Internet research

tools available to use, 4.65; and I have a basic knowledge of computers, 4.37. This means that the respondents know how to use other software tools also in computer, especially with regards to internet usage.

Four statements obtained a verbal interpretation of "agree" and these are: I feel confident about using computers, 3.97; I have a working knowledge of computer terminology, 3.44; I understand the technical aspects of computers, 3.42; I feel secure about my ability to interpret a computer Manual, 3.36. These show that the respondents have the confidence in using computers, have basic knowledge in the terminologies used in computers as well as the technical aspects and understanding of the computer manual. However, there are still students who avoided using computers because they are new to them and have any knowledge on how to use it.

The findings revealed that the respondents acquired basic technical knowledge of computer, but have full knowledge on how to use computers especially in using internet-based tools and software.

Competence in basic skills

Responses on the competence in basic skills of the respondents which includes hardware or equipment, operating system, application and software, use of the information system, and use of the information that is contained in the source service were discussed and presented in this segment.

Level of Competence

Table 10 presents the level of competence in basic skills of the respondents.

Table 10: Level of Competence in basic skills

Level	Range	F	%
High	16-20	5	1.91
Moderate	10 - 15	62	23.66
Low	7 - 11	195	74.43
Total		262	100.00

In the level of competence in basic skills, majority of the respondents are "low", which means that their knowledge are limited only to the basics of computers, like how to open and closed it, using Microsoft word and excel, and also the use of internet and other social networks. For the technical aspects of the computers, they only have limited knowledge. Few only have showed their competence in the basic skills in computer. Since majority of the respondents are females, they do not have interest on learning the operating system of the computers than the males. They are only after on getting basic knowledge on how to use computers.

Hardware or equipment

Table 11 presents the weighted mean and verbal description obtained by the responses of the respondents on their competence in hardware or equipment.

Table 11: Competence in Basic Skills in Hardware or Equipment

Hardware or equipment-related knowledge and Skills:	Weighted Mean	Verbal Description
Turn on/off a computer, monitor and printer.	4.44	Strongly Agree
Have keyboarding skills beyond 10 words per minute.	3.84	Agree
Operate a mouse with click, double click and click and drag.	4.66	Strongly Agree
Connect and use a modem.	3.76	Agree

Noticeably, the weighted mean obtained by the statements:

"Operate a mouse with click, double click and click and drag," 4.66, and "Turn on/off a computer, monitor and printer, 4.44, have been described as "strongly agree" by the respondents. The respondents agreed that they knew only the basic operations of computers which can be easily learned because computers nowadays are user friendly.

In terms of typing skills or keyboarding skills, the respondents agreed that they could type, but do not have the standard speed per hour or even type beyond 10 words per minute. This shows that the respondents do not have skills on this aspect. Before they can acquire such skills, hands-on activities in computer are needed so that they can be familiar with the keys and be used to using touching the keyboard. The next one is "connect and use modem, 3.76." Skills are needed in using the modem. It is not just to connect the modem, but to know also its use when it is connected to computers. The respondents agreed that they do not have knowledge and skills on how to use computer hardware.

Technically, the respondents are far from acquiring skills on how to use computer hardware and equipment, because their knowledge only are very basic sufficient enough to know how to use the mouse, open and close the computer.

Operating System

Table 12 presents the level of competence on the basic skills of the respondents in operating system.

The table shows that majority of the respondents are very knowledgeable with regards to the operating system of the computers, others are moderate, and few have low level of competency in operating system. The respondents have the know -

how on the use of the operating system, which can be said as the basics in operating system like, save or copy files to hard drive or disk, and start or open a software program. Students were very familiar with this system because they often use these functions in computer.

Level	Range	F	%
High	30-40	132	50.38
Moderate	19-29	122	46.56
Low	8 – 18	8	3.05
Total		262	100.00

Table 12: Basic skills in Operating System

Level	Range	F	%
High	30-40	132	50.38
Moderate	19-29	122	46.56
Low	8 - 18	8	3.05
Total		262	100.00

Competence in Basic Skills in Operating System

The weighted mean and verbal descriptions of the responses of the students are as follows. Save or copy files to hard drive and disk obtained the highest weighted mean of 4.35, which was described as strongly agree. This means that the respondents strongly agreed that they know how to save files in a hard drive or in a disk. They acquire knowledge on this in their computer class and aside from that, with the use of technology-based instructions in the classroom, teachers are giving homework or any research works that need them to submit in a disk or in a hard drive.

The following statements got a verbal description of "agree": Start a software program, 4.10; Use Windows online Help feature, 3.97; Use the Windows operating system, 3.95; Manage a hard drive (using folders and directories), 3.71; Scan disks for viruses, 3.52; Install a new software program, 3.31; and Format a disk, 3.27.

It can be deduced that in terms of competency in operating system, the respondents did not have sufficient knowledge in some features of the operating system like starting a software program, install new software, opening a windows and use the online help feature, manage a folder and format a disk. These functions complex in functions and one wrong click will affect other functions or systems in the windows operating system.

Since students are not equipped yet of the necessary knowledge and skills needed in using computers, they have only limited know-how on the operating system of the computer.

Applications Software

In this portion, the discussions on the level of competency in application software of the respondents were presented.

Table 14: Level of competency in Application Software

Level	Range	F	%
High	41-55	177	67.56
Moderate	26-40	81	30.92
Low	11 -25	4	1.53
Total		262	100.00

It can be seen on the table the level of respondent's competency in application software. It shows that the 67.56% of the respondents have high level of competency in terms of application software in computer. These were the respondents who used computers very often. They were the students who have the exposure and hands-on training or practice in computers. The other 32.92% of respondents showed moderate knowledge in application software, while 1.53% of the respondents have low skills, which means they were not familiar with the functions of application software because they have limited hands-on experience only based on their secondary background where majority of them came from public schools.

In table 15, the data shows the weighted means and verbal descriptions given to each statement where they showed their knowledge in different tools in application software. The highest mean was given to "Draw simple graphical shapes and objects," 4.18. For beginners, the first things that they learned in using computer is to make simple lines, shapes and draw an objects and put color in it. This was the time they tried to be familiar with the use of the mouse, keyboard and other tools. The second highest mean was Access the Internet using a Web browser, 4.16, followed by "Send and receive e-mail messages," 4.13. The respondents gain basic skills in this application because of the worldwide craze in social networks where everyone, regardless of age and status in life, joined the whole world in using these applications. The use of technology in the classroom made the students aware of these applications and trends in computer phenomena.

Table 15: Competency in Basic skills in Application Software

Applications software knowledge and skills:	Weighted Mean	Verbal Description
Create a document with a word processor.	3.96	Agree
Enter data into an existing spreadsheet.	3.91	Agree
Create a new spreadsheet.	3.97	Agree
Create charts and graphs from a spreadsheet.	3.85	Agree
Enter data into an existing database.	4.08	Agree
Create a new database.	3.73	Agree
Create a database report.	3.95	Agree

Draw simple graphical shapes and objects.	4.18	Agree
Create a multimedia presentation.	3.89	Agree
Access the Internet using a Web browser.	4.16	Agree
Send and receive e-mail messages.	4.13	Agree
Send and receive e-mail messages with attachments.	3.96	Agree
Download files from the Internet.	3.91	Agree
Communicate through a class mailing list or web site.	3.97	Agree

Fourth highest is "Enter data into an existing database," 4.08, which means that the respondents can type and enter data in existing database like, Microsoft word or Microsoft excel. The students are very familiar to these applications, because they often use them in their assignments or other projects in their subjects.

Others were given also a verbal of description of "agree" and these were the following statements: Create a new spreadsheet, 3.97; Communicate through a class mailing list or web site, 3.97; Send and receive e-mail messages with attachments, 3.96; Create a document with a word processor, 3.96; Create a database report, 3.95; Download files from the Internet, 3.91; Enter data into an existing spreadsheet, 3.91; Create a multimedia presentation, 3.89; Create charts and graphs from a spreadsheet, 3.85; and Create a new database, 3.73. The respondents showed their skills in creating new applications in a computer, they can open a new spreadsheet in excel, can make a multimedia presentation with the use of charts and graphs and also know how to download files from the internet and transfer it to a new folder and other task they are familiar and expose to these software by having hands-on experience using all them for their requirements in school.

In this aspect, the respondents prove that they have high competency level in the basic skills using application software in computer. They can type, they can draw lines, graphs, objects and create new features in the application software.

Use of the Information System

The level of competency of the respondents in information system is presented in table 16.

Table 16: Level of Competence in Information System

Level	Range	F	%
High	16-20	92	35.11
Moderate	10 - 15	139	53.05
Low	7 - 11	31	11.83
Total		262	100.00

Based on the results, the respondents have moderate competency in information system. One hundred thirty nine (139) were moderate in their knowledge in information system, while ninety two (92) have high competency and thirty one (31) were low. The data show the inability of the respondents to learn and understand some acronyms used in describing the parts of computer as well as the use of the shortcuts and other software and tools in information system of the computer.

The data in table 17 show that the respondents agreed
to the level of their competence in the basic skills in information system, and as evidenced by the weighted mean received by each statement: Understand the way that information is stored--Binary numbering system, 3.95; Knowledge of acronyms such as CPU, RAM, and MB, 3.53; Understand three character file types and properties, 3.45; Maintenance of computer system, 3.45; and Ability to associate file types with applications, 3.42.

Table 17: Competence in Basic Skills in Information System

Knowledge and skills associated with the use of the information system itself:	Weighted Mean	Verbal Description
Understand three character file types and properties.	3.45	Agree
Ability to associate file types with applications.	3.42	Agree
Understand the way that information is stored--Binary numbering system.	3.95	Agree
Knowledge of acronyms such as CPU, RAM, and MB.	3.53	Agree
Maintenance of computer system.	3.45	Agree

The results revealed that the respondents have only limited knowledge on the basic skills in using information system. They know how to store binary numbering system, know also the acronyms used in describing the parts of computer and other applications which they were able to associate with the file types. Since the respondents were in between age of 16-21 years old, they could easily memorize these terms, acronyms and some tools and applications in the computer. They are very eager to learn things about computers because of its usefulness to their studies, especially if they want to explore the whole world through the use of some applications that would bring them to a website that would help them get information. This stage of their life is the age wherein they have curiosity on the things around them, and this curiosity would drive their interest to discover new knowledge through the use of computer.

Use of the information that is contained in the source or service

The data on table 18 explains the level of competency in the basic skills of the respondents in using the information system. that is contained in the source service.

The data shows the respondents level of competency in information that is contained in the source of service. One hundred twenty or 45.80% showed moderate knowledge; 114 or 43.51, high and 28 or 10.69 low. This means that the respondents have only little knowledge on this because this is more complex than the other basic applications and operating system in computer.

Table 18: Level of competency in information that is contained in the source or service

Level	Range	F	%
High	16-20	114	43.51
Moderate	10 – 15	120	45.80
Low	7 – 11	28	10.69
Total		262	100.00

The weighted mean obtained by the statement about the competency in information that is contained in the source or service will explain the moderate level of competency of the respondents: Find information from a variety of sources, 3.86; Present the information utilizing computer technology, 3.69; Evaluate information and selecting relevant data, 3.68; and Organize the information from multiple sources, 3.56.

Table 19: Competence in information that is contained in the source or service

Knowledge and skills associated with using the information that is contained in the source or service:	Weighted Mean	Verbal Description
Find information from a variety of sources.	3.86	Agree
Evaluate information and selecting relevant data.	3.68	Agree
Organize the information from multiple sources.	3.56	Agree
Present the information utilizing computer technology.	3.69	Agree

The results show that the respondents were not equipped yet of the necessary technology knowledge on this aspect but has the interest to learn. Using the information that is contained in the source or service has complexity and would be difficult for the respondents to learn it in one sitting down. They need to do it repeatedly so that they could do it with ease and without difficulty.

The findings revealed that the respondents have moderate skills in the basic applications of computer. They need to be familiar with the tools and other operating systems in order for them do it with ease and speed. What they have in secondary was basic knowledge like how to open and close the computer and to use the mouse and drag it. Other applications and operating systems are complex which needs them hands-on experience to learn and apply them.

IV. CONCLUSIONS AND RECOMMENDATIONS

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

1. Majority of the respondents are between the ages of 19-21 or 48.09% of the total number of respondents, most are females, 191, enrolled in Bachelor of Science in Business Administration, 126, and come from public schools, 213, and under the revised secondary school curriculum, 244.

2. The respondents acquired their computer literacy based on their accessibility to desktop computer (241), digital camera (234) and laptop computer (226).

3. The respondents showed their awareness in their level of computer literacy, which is moderate.

4. In their level of competence in basic skills the respondents have a low level of skills.

5. Redesigning the curriculum of the non-IT courses and include the following suggestions to enhance the knowledge and competence of the non-IT students: Increase the number of units for information technology subjects, More complex technology-based research works for the students, Integration of exposure to the new hardware, new applications, new information system and new operating system of the computer in the subjects which need the use of computer.

The following recommendations which were based on the findings and conclusions of the study were offered:

1. Careful study on the present curriculum should be done by the Curriculum Development Office to find out if there is a need to increase the number of information technology subjects in their curriculum.

2. Trainings and seminars should be given to teachers and students on the use of new hardware and software applications.

3. The data and the results of this study can be used as a basis of the Curriculum Development Office of NEUST to enhance the curriculum of non-information technology course.

4. The NEUST administration should take into consideration the findings of the study to enhance the information technology competency of the students if they want to produce graduates who are globally competitive.

5. Teachers should be encouraged to increase the use of technology-based instruction, and materials to expose and increase the awareness of the students in technology innovations.

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