

Assessment of ICT Skills of Science Teachers for Online Instruction

Cyril Francisco Forro

Department of Science
Koronadal National Comprehensive High School
Koronadal City, Philippines
lirycthesongwriter@gmail.com

Abstract-This study was conducted to assess the level of ICT skills of science teachers for online instruction and employed a qualitative-descriptive research design. This was conducted in the school year 2020-2021. This study utilized a survey questionnaire, which was adapted from National ICT Competency Standards for Teachers, in gathering the data from 37 science teachers of Koronadal National Comprehensive High School-Junior High School (KNCHS-JHS). All science teachers of KNCHS-JHS were considered as respondents of this study. The method used in the collection of data was face to face administration of survey. Frequency counting and mean were utilized to analyze the demographic profile of the respondents. In analyzing and interpreting the level of ICT skill of science teachers, mean was utilized. The findings of the study revealed that the level of ICT skills of science teachers in all standards of Domain A (Technology Operations and Concepts), Domain B (Social and Ethical), and Domain C (Pedagogical) is proficient. This is shown by the means of Domains A, B, and C which are 2.87, 2.79, and 2.84 respectively. In proficient level, teachers here can perform ICT skills independently but require guidance at times. On the other hand, the level of ICT skill of science teachers in all standards of domain D (Professional) is basic with a mean of 2.42. This means that teachers can perform ICT skills with the guidance of an ICT expert. There are also some indicators in domains A, B, and C where the level of ICT skills of science teachers is basic. Generally, the level of ICT skills science teachers is proficient. Meaning, they can perform ICT skills independently but require guidance at times. Based on the results of this study there is a need to conduct an ICT training for science teachers to further enhance some of their ICT skills/competencies. Thus, the author of this action research recommends that the proposed ICT training be conducted to the science teachers of KNCHS-JHS. The ICT training shall include all indicators which was rated basic by the respondents.

Keywords-Online delivery learning, ICT competencies, assessment, descriptive-quantitative research, Philippines.

I. INTRODUCTION

Best practices and best learning materials used in classrooms with the aid of ICT were observed to improve academic performances of students. Also, the use of ICT in conducting classes was noted to have positive impact on the over-all teaching and learning process including research. It also increases the flexibility of teachers and learner for they can still conduct or attend classes remotely from the convenience of their own homes. Thus, the utilization of ICT resources in classroom is essential (Noor-Ul-Amin, n.d.).

In the study of Ghavifekr, S., et. al.(n.d.), they stressed that; "In this digital era, ICT use in the classroom is important for giving students opportunities to learn and apply the required 21st century skills." Indeed, this is really true especially during this time of pandemic wherein we are discouraged to go out of our homes. Almost everyone utilizes technology or their devices like cellphone in many transactions. This includes enrolling

their children to school. Schools now are implementing online classes. Here, relevance of knowledge and skills in ICT are needed. They added that some of the challenges faced by the teachers in integrating or using ICT tools in the lesson are "limited accessibility and network connection, limited technical support, lack of effective training, limited time and lack of teachers' competency." They rated the use of ICT in the classrooms as average. This means that enhancement or improvement in the use of ICT in classes is needed.

Similar to the observations of Ghavifekr, S., et. al.(n.d.), findings in the study of Kamaruddin, K., et.al.(2017) revealed that most of the teachers were having knowledge about the usefulness of ICT in education. The problem is their level of integration of ICT in the lesson. It was found out to be at low level. Lower than the level that was discovered by Ghavifekr, S. and the team. Accordingly, this finding was based on the results of the study that teachers are common users of ICT applications in work rather than in teaching and learning in the classroom. This finding was boosted by another

finding on teachers perceived awareness towards the importance of ICT. They perceived that ICT is not that important brought by issues on trainings given to them, provision of equipment and time constraints. These problems resulted to discouraging perception of teachers on the importance of ICT and resulted to failure in integrating ICT in instruction inside the classroom.

In the study of Caluza, L. J., et.al.(2017), it was noted that most of the teachers need improvement for they have only basic knowledge on ICT. They proposed more trainings for teachers so that teachers can integrate their learnings from trainings into their teaching and in other educational related tasks they have. This will eventually result to improved performance of teacher and school will enhance the quality of its educational services. For teachers are not yet competent in terms of ICT, they recommended ICT trainings so that teachers will be developed professionally in terms of ICT. Specifically, focus is directed to how these teachers will utilize ICT in teaching-learning process in the classroom and in their other teaching-related works. This should be done to enhance the ICT knowledge and skills of the teachers. Along these statements, showing how important knowledge and skills in ICT are, with the presented challenges faced by the teachers in integrating ICT in lessons and in using ICT in other education related tasks, this study was proposed and was conducted by the author. This study assessed the ICT skills of teachers for online instruction and proposed an ICT skills enhancement training for science teachers of KNCHS-JHS.

1. Statement of the Problem

This study aimed to determine the level of ICT skills of science teachers for online instruction.

Specifically, the study determined the following:

1.1. Demographic profile of the respondents in terms of:

- Age
- Gender
- Highest Educational Attainment
- Number of trainings attended related to ICT
- Availability of ICT resources

1.2. Level of ICT skills of the science teachers on the following domains:

- Technology Operations and Concepts
- Social and Ethical
- Pedagogical
- Professional

1.3. ICT training that can be conducted to enhance the competencies of science teachers.

2. Significance of the Study

The findings of this study will be useful to the school administrators, teachers, and future researchers.

This study will help the school administrators in crafting plan and implement it to help teachers improve their ICT skills. For the faculty, through the ICT trainings that will be the result of this research, they will be more ICT competent and their skills might be improved. This will address their difficulties in conducting online instruction as the educational system shifts to the new norm. This will also help the school leaders in understanding the needs of their teachers to effectively deliver the teaching process and will eventually build harmonious relationship with their fellow teachers.

Moreover, the results of this study hope to encourage other researchers to conduct similar study to identify the ICT skills of teachers. Then, ICT trainings shall be conducted to address the needs of teachers in enhancing their competencies in ICT. This will prepare them to be ready in the conduct of online instruction.

3.Scope and Limitation

This study focused mainly on the assessment of ICT skills of science teachers of Koronadal National Comprehensive High School – Junior High School (KNCHS-JHS). All 37 science teachers of KNCHS-JHS for the school year 2020-2021 were considered as respondents of this study. KNCHS-JHS is located at Rizal Street, Brgy. Zone IV. Koronadal City. This study utilized a survey questionnaire which was adapted from the National ICT Competency Standard (NICS) for Teachers. Data obtained from the survey were tabulated and analyzed using Microsoft Excel Application. Percentage and mean were used in analysing and presenting the data. In addition, the results of this research were therefore accurate only for the respondents concerned for the particular period of time, while these could be used as springboard for future studies that would be administered at the different schools in the country.

4. Conceptual Framework

In assessing and describing the ICT skills of science teachers which will be the basis for ICT training, the conceptual framework shown below was used. It shows the variables of this study and the interrelatedness of these variables to one another.

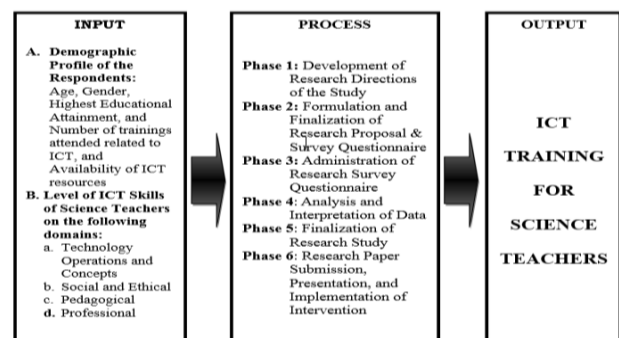


Fig. 1. Conceptual Framework of the Study.

5. Definition of Terms

- **Assessment** refers to evaluation of ICT skills of science teachers.
- **ICT Skills** refers to the skills of science teachers in reference to National ICT Competency Standard (NCIS) for Teachers.
- **Science Teachers** refer to the science teachers of Koronadal National Comprehensive High School – Junior High School (KNCHS-JHS) for the school year 2020-2021.
- **Online Instruction** refers to the process of teaching the students via internet. This is done by conducting the classes using different platforms utilizing the internet technology.
- **ICT Resources** refer to the gadgets owned by teachers or any information and communication technologies which teachers have access to.
- **Technology Operations and Concepts** refer to one of the domains of National ICT Competency Standards (NCIS) for Teachers. This domain includes competencies related to technical operations and concept, and productivity of various ICT tools like computers and communication devices as well as application available on-line or off-line.
- **Social and Ethical** refer to one of the domains of National ICT Competency Standards (NCIS) for Teachers. This domain includes competencies related to social, ethical, legal and human issues, and community linkage.
- **Pedagogical** refers to one of the domains of National ICT Competency Standards (NCIS) for Teachers. This domain includes competencies related to the use of technology in the following components of an instruction process such as planning and designing effective learning environments and experiences supported by technology; implementing, facilitating and monitoring teaching and learning strategies that integrate a range of information and communication technologies to promote and enhance student learning; and assessing and evaluating student learning and performances.
- **Professional** refers to one of the domains of National ICT Competency Standards (NCIS) for Teachers. This domain includes competencies related to professional growth and development, research, innovation and collaboration.

II. METHODOLOGY

1. Research Design

The researcher utilized a descriptive method for this study which involved a survey questionnaire to assess the level of ICT competencies of the science teachers of Koronadal National Comprehensive High School-Junior High School, Division of Koronadal City.

Figure 2 shows the research design of this study. It shows that this study described the demographic profile of the respondents, described the level of ICT skills of science teachers and recommended ICT training for science teachers. It is also shown in the research design that this study was conducted in Koronadal National High School – Junior High School. All (37) science teachers were the respondents of the study. Moreover, a survey questionnaire was utilized in gathering the data from the respondents. The survey was conducted personally by the researcher with the science teachers with the observance of health protocols and physical distancing. Percentage and mean were utilized in analysing and interpreting the data gathered by this study.

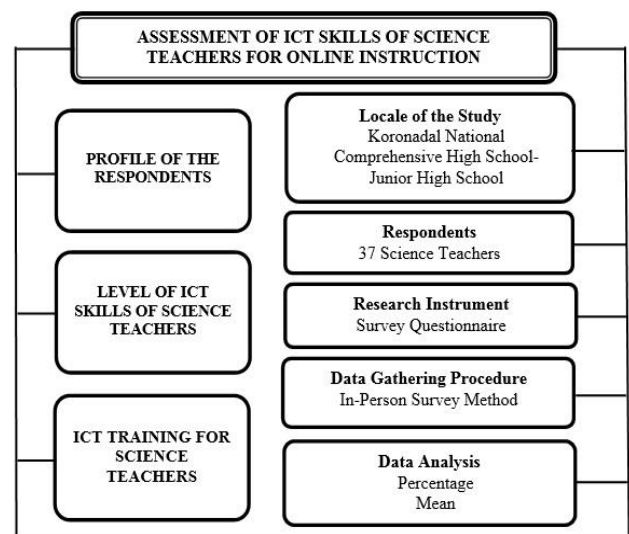


Fig. 2. Research Design.

2. Locale of the Study

This study was conducted in the Science Department of Koronadal National Comprehensive High School-Junior High School, Rizal Street, Brgy. Zone IV, Koronadal City. Koronadal City is part of South Cotabato province. The respondents were science teachers at KNCHS-JHS, Koronadal City. Figure 3 shows the location of KNCHS-JHS at Koronadal City, South Cotabato.

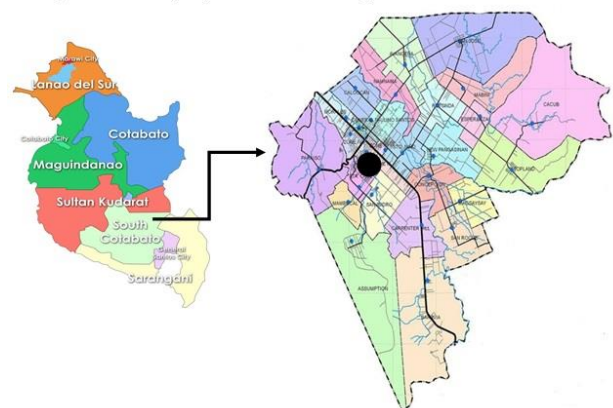


Fig. 3. Map of Koronadal City

3. Respondents of the Study

The respondents of this study were the 37 science teachers of Koronadal National Comprehensive High School-Junior High School who were selected for the purpose of this study. They are all science teachers of science department of KNCHS-JHS. Their profile is shown below.

Table 1. Profile of the Respondents of the Study.

Position	Male	Female	Total
Teacher I	4	14	18
Teacher II	0	3	3
Teacher III	1	10	11
Master Teacher I	1	4	5
Total	6	32	37

4. Research Instrument

The researcher utilized survey questionnaires as data gathering tool for this study. The instrument has two parts. The first part of the tool collected the demographic profile of the 37 science teachers and the second part focused on the assessment of the ICT skills of science teachers in accordance with the standards of Commission on Information and Communications Technology. The survey questionnaire was an adaption of National ICT Competency Standards (NICS) for teachers. Part I asked the teachers about their age and gender, their highest educational attainment, the number of ICT trainings they attended, and number of gadgets/ICT resources they have access to. Part II focused on assessing the level of ICT skills of teachers in terms of four domains: Technology Operations and Concepts, Social and Ethical, Pedagogical, and Professional. The questionnaire was composed of 76 indicators extracted from four domains of NICS for Teachers. Four (4) scales were given for the respondents to select from, 4 being the highest and 1 as the lowest.

The respondents were advised to answer the survey questionnaire and rate themselves based on their perception of their own ICT skills. The rating scale shown below was the basis of the respondents in rating themselves.

Table 2. Rating Scale for the ICT Skills of Science Teachers.

Rating Scale	Description
4	Can perform independently without guidance
3	Can perform independently but require guidance at times
2	Can perform with guidance
1	Cannot perform or never performed before

5. Data Collection and Analysis

After the approval of the conduct of this action research, the researchers asked permission from the school head of the concerned school. When the study was allowed to be conducted, respondents were informed, via text messages and messages in messenger, that they will be answering a survey questionnaire to assess their ICT skills. The survey questionnaires were distributed to the respondents through in-person distribution. Respondents were given enough time to think about the questions as stated on the questionnaire, thus producing more accurate information. The respondents were informed that any data gathered will be kept confidential. The researcher employed descriptive statistics such as frequency counting, percentages and mean. Responses from the questionnaires were directly encoded and analyzed using Microsoft Excel application – descriptive statistics (frequency counts, percentages, and mean). Frequency counting and percentage were used in describing the profile of the teachers. Mean were used in identifying and describing the level of ICT skills of the respondents in every indicator and domain. Weighted Mean was utilized also in describing the over-all level ICT skills of science teachers. The mean of each item in the instrument was determined based on the following formula: $x = \frac{\sum x}{n}$ where; x = weighted average x = score of each respondent n = number of responses. In analyzing and interpreting the data obtained by this research, the researcher utilized Table 3. It shows the ranges of means, their qualitative descriptions, and interpretation for each range of means.

Table 3. Conversion of Rating Scale Values for the Level of ICT skills of Science Teachers.

Range of Means	Qualitative Description	Interpretation
3.26 – 4.00	Advanced	Can perform independently without guidance
2.51 – 3.25	Proficient	Can perform independently but require guidance at times
1.76 – 2.50	Basic	Can perform with guidance
1.00 – 1.75	Digital Illiterate	Cannot perform or never performed before

III. DISCUSSION OF RESULTS

This contains the demographic profile of the science teachers and the level of the ICT skills of science teachers in every indicator, standard, and domain. The overall level of ICT skills of science teachers is also included here. The proposed ICT skills enhancement training for science teachers is also attached here.

1. Demographic Profile of the Respondents

Table 4. Age Profile of Respondents.

Age (Years old)	Total Number of Respondents	Percentage (%)
21 – 30	8	21.62
31 – 40	10	27.03
41 – 50	6	16.22
Above 50	13	35.14

Table 4 shows that most of the science teachers are 50 years old or older than 50. There are 13 of them that constitute 35.14% of the total population of science teachers.

Table 5. Gender of Respondents.

Gender	Total	Percentage (%)
Male	5	13.51
Female	32	86.49

In table 5, we can see that most of the respondents of this study are female. They constitute 86.49% of the respondents of this research.

Table 6. Highest Educational Attainment of the Respondents.

Highest Educational Attainment	Total	Percentage (%)
Bachelor's Degree Holder	11	28.95
MA units (CAR)	16	42.11
Master's Degree Holder	10	26.32
PhD units (CAR)	1	2.63
Doctoral Degree Holder	0	0.00

Table 6 shows that most of the respondents who participated in this study had units in Master's Degree or had completed the academic requirements of the Master's Degree. There are 16 of them and they constitute 42.11% of the respondents. It is noticeable also that none of the respondents was able to finish a doctoral degree.

Table 7. Number of ICT Trainings Attended.

Number of ICT Trainings Attended	Total	Percentage (%)
0	4	10.8
1 – 3	27	73.0
4 – 6	2	5.4
More than 6	4	10.8

It is shown in table 7 that most (27) of the science teachers attended at least 1 to 3 ICT trainings for the last

three years. They constitute 73% of the respondents of this research.

Table 8. Number of ICT Resources/Gadgets that the Teachers can Access.

Number of ICT Resources/Gadgets	Total	Percentage (%)
0	0	0.00
1 – 3	33	89.19
More than 3	4	10.81

Table 8 shows that all teachers either owned gadgets or have access to ICT resources for online instruction. Most (33) of the teachers have access to 1 to 3 gadgets or ICT resources. They constitute 89.19% of the respondents.

2. Level of ICT Skills of Science Teachers

2.1 Domain A: Technology Operations and Concepts

Competency Descriptor: This domain includes competencies related to technical operations and concept, and productivity of various ICT tools like computers and communication devices as well as application available online or offline.

Table 9. Standard 1: Demonstrate knowledge and skills in basic computer operation and other information devices, including basic troubleshooting and maintenance.

Indicators	Mean	Qualitative Description
1. Identify and define the functions of the main components (i.e. monitor, CPU, keyboard, mouse) of the computer	3.51	Advanced
2. Identify and define the functions of computer peripherals (i.e. printer, scanner, modem, digital camera, speaker, etc.)	3.30	Advanced
Properly connect main components, configure peripherals and install drivers when required	3.11	Proficient
4. Configure computer settings of various software and hardware	2.76	Proficient
5. Understand the basic functions of the operating system	2.89	Proficient
6. Organize and manage computer files, folders and directories	3.65	Proficient
7. Use storage devices (i.e. hard disk, diskette, CD, flash memory, etc.) for storing and	3.19	Proficient

sharing computer files. Create back-ups of important files		
8. Protect the computer from virus, spyware, adware, malware, hackers etc.	2.65	Proficient
9. Use online and offline help facilities for troubleshooting, maintenance and update of applications	2.70	Proficient
General Mean	3.08	Proficient

Table 9 shows that science teachers are advanced in first two indicators of standard 1 of domain A. Meaning they can identify and define the functions of the main components (i.e. monitor, CPU, keyboard, mouse) of the computer independently without guidance. They can also identify and define the functions of computer peripherals (i.e. printer, scanner, modem, digital camera, speaker, etc.) independently without guidance. On the other hands, they can perform independently what are indicated by the remaining indicators in standard 1 of domain A but they need guidance at times. All in all, they can perform independently what are indicated in domain A but they require guidance at times. This is shown by the mean of 3.08 which is qualitative described as proficient.

Table 10. Standard 2: Use Appropriate office and teaching productivity tools.

Indicators	Mean	Qualitative Description
10. Use a word processor to enter and edit text and images	2.86	Proficient
11. Format text, control margins, layout and tables	2.92	Proficient
12. Print, store and retrieve text documents from a word processor	3.24	Proficient
13. Use a calculation spreadsheet to enter data, sort data and format cells into tables	3.00	Proficient
14. Make computation, use formula and create graphs using spreadsheets	2.78	Proficient
15. Print and store data tables using a spreadsheet application	2.65	Proficient
16. Use a presentation package to add text and sequence a presentation	2.70	Proficient
17. Enhance slide presentations by adding sound, customizing animation and inserting images	2.62	Proficient
18. Print presentation handouts and store slide presentations	3.00	Proficient
19. Make effective class presentations using the slides and LCD projector	2.95	Proficient
20. To acquire digital images	2.86	Proficient

and other media from web sites, CD, flash drives, etc.		
21. Crop, scale, color correct and enhance digital images	3.73	Advanced
22. Play various media files using appropriate media players	2.84	Proficient
23. Stitch together video footages and sound tracks and add simple enhancements - transitions, titles, etc.	2.57	Proficient
24. Attach and configure scanners, cameras, cell phones to acquire digital images	2.19	Basic
25. Store digital images using optical media (CD, DVD, flash disk) and online repositories	2.78	Proficient
General Mean	2.86	Proficient

Table 10 shows that, generally, the science teachers can perform ICT skills in standard 2 of Domain A but they require guidance at times. This is displayed by the mean of 2.86 which is qualitative described as proficient. Also, teachers can crop, scale, color correct and enhance digital images independently without guidance shown by the rating of 3.73. Unluckily, they can only attach and configure scanners, cameras, cell phones to acquire digital images with the guidance of an ICT expert shown by the mean of 2.19.

Table 11. Standard 3: Understand and effectively use the Internet and network applications and resources.

Indicators	Mean	Qualitative Description
26. Connect to the internet via dial-up or LAN	2.68	Proficient
27. Configure and use Web Browsers and Help applications	3.08	Proficient
28. Send and receive emails with attachments, manage emails and use LAN and Web-based mail servers	2.95	Proficient
29. Effectively use synchronous and asynchronous web based communication tools like instant messengers, voice and teleconferencing	3.03	Proficient
30. Connect and use shared printers, shared folders and other devices within a network	2.84	Proficient
31. Effectively use search engines, web directories and bookmarks	2.65	Proficient
32. Download and install relevant applications including freeware, shareware, updates, patches, viewers and support applications	2.70	Proficient
General Mean	2.85	Proficient

Table 11 indicates that the teachers are proficient in all indicators in standard 3 of domain A. Generally, they are proficient as revealed by the mean of 2.85. This means that they can perform all that are indicated, but they need guidance at times.

Table 12. Standard 4: Demonstrate knowledge and skills in information and data management.

Indicators	Mean	Qualitative Description
33. Effectively use search engines, directories, crawlers and agents to locate information sources	2.76	Proficient
34. Search and collect textual and non-textual information from online and offline sources	2.62	Proficient
35. Efficiently store and organize collected information using directories, drives, or databases	2.76	Proficient
36. Distribute, share, publish and print information via print or web	2.59	Proficient
37. Properly acknowledge information sources – online and offline	2.78	Proficient
General Mean	2.70	Proficient

Table 12 displays that science teachers are proficient in all indicators in standard 4 of domain A. Generally, they are proficient as revealed by the mean of 2.70. Meaning, they can perform all that are indicated by the indicators, but they need guidance at times.

2.2 Domain B: Social and Ethical

Competency Descriptor: This domain includes competencies related to social, ethical, legal and human issues, and community linkage.

Table 13. Standard 1: Understand and observe legal practices in the use of technology.

Indicators	Mean	Qualitative Description
38. Understand the legal implications of Software Licenses and Fair Use	2.54	Proficient
39. Understand and explain the basic concepts of Intellectual Property Rights	2.49	Basic
40. Differentiate and identify the Copyright, Trademark, Patent of various products	2.46	Basic
General Mean	2.50	Basic

Table 13 reveals that teachers are proficient in understanding the legal implications of software licenses and fair use. This means that they can perform this but they need guidance at times. The table further shows that

teachers can understand and explain the basic concepts of Intellectual Property Rights and can differentiate and identify the Copyright, Trademark, Patent of various products but they need guidance. Generally, they can perform the competencies indicated in standard of domain B with guidance as shown by the mean of 2.50 which is quantitatively described as basic.

Table 14. Standard 2: Recognize and practice ethical use of technology in both personal and professional levels.

Indicators	Mean	Qualitative Description
41. Detect plagiarism in student work	2.35	Basic
42. Properly acknowledge sources used in own work	2.76	Proficient
43. Be an Anti-Piracy advocate for all products with IPR like music, data, video and software	3.03	Proficient
44. Advocate the responsible use of various technologies like computers, cell phones, etc.	2.84	Proficient
45. Show respect for privacy and cyber etiquette, phone etiquette and similar use of technology	3.11	Proficient
General Mean	2.82	Proficient

Item 41 in Table 14 yielded the lowest rating of 2.35 which is described as basic. This means that teachers can detect plagiarism in student work with guidance of an ICT expert. Items 42 – 45 yielded ratings which are described as proficient. Meaning teachers can execute the skills in these items but they require guidance at times.

Table 15. Standard 3: Plan, model and promote a safe and sound technology supported learning environment.

Indicators	Mean	Qualitative Description
46. Demonstrate proper handling of computer devices and use of applications	3.22	Proficient
47. Monitor how students use the computer specifically on software, hardware, computer games, and internet activities	2.73	Proficient
48. Maintain a clean and orderly learning environment for students	2.78	Proficient
49. Promote and implement rules and regulations on properly using computers	3.19	Proficient

50. Accurately report malfunctions and problems with computer software and Hardware	3.14	Proficient
General Mean	3.01	Proficient

Table 15 shows that the teachers can demonstrate proper handling of computer devices and use of application; can monitor how students use the computer specifically on software, hardware, computer games, and internet activities; can maintain a clean and orderly learning environment for students; can promote and implement rules and regulations on properly using computers; and can accurately report malfunctions and problems with computer software and hardware independently but require guidance at times. This is displayed by the rating of 3.01 that is described as proficient.

Table 16. Standard 4: Facilitate equitable access to technology that addresses learning, social and cultural diversity.

Indicators	Mean	Qualitative Description
51. Design class activities to minimize the effect on students being disadvantaged or left-out	2.81	Proficient
52. Help minimize the effects of the digital divide by providing access to digital materials for all students	2.65	Proficient
53. Prepare lessons and activities appropriate to the level of learning and cultural background of students	2.92	Proficient
54. Adapt activities using specialized hardware and software for physically disadvantaged students	2.95	Proficient
General Mean	2.83	Proficient

Table 16 shows that the teachers can perform the following independently but require guidance at times: design class activities to minimize the effect on students being disadvantaged or left-out, help minimize the effects of the digital divide by providing access to digital materials for all students, prepare lessons and activities appropriate to the level of learning and cultural background of students, and adapt activities using specialized hardware and software for physically disadvantaged students. This is displayed by the rating of 2.83 that is described as proficient.

2.3 Domain C: Pedagogical

Competency Descriptor: This domain includes competencies related to the use of technology in the following components of an instruction process: 1) planning and designing effective learning environments and experiences supported by technology; 2)

implementing, facilitating and monitoring teaching and learning strategies that integrate a range of information and communication technologies to promote and enhance student learning; and 3) assessing and evaluating student learning and performances.

Table 17. Standard 1: Apply technology to develop students' higher order thinking skills and creativity.

Indicators	Mean	Qualitative Description
55. Make students use databases, spreadsheets, concept mapping tools and communication tools, etc.	2.38	Basic
56. Encourage students to do data analysis, problem solving, decision making and exchange of ideas	2.84	Proficient
General Mean	2.61	Proficient

Results of the study in Table 17 reveals that teachers can make students use databases, spreadsheets, concept mapping tools and communication tools, etcetera with guidance of an ICT expert. This is shown by the rating of 2.38 which is described as basic. On the other hand, Item 56 in Table 17 yielded a rating of 2.84 which is described as proficient. This means that teachers can independently encourage students to do data analysis, problem solving, decision making and exchange of ideas but require guidance at times. All in all, teachers can perform independently the skills indicated in table 17 but they require guidance at times. This is displayed by the mean of 2.61 which is qualitatively describes as proficient.

Table 18. Standard 2: Provide performance tasks that require students to locate and analyze information and to use a variety of media to clearly communicate results.

Indicators	Mean	Qualitative Description
57. Use appropriately slide presentations, videos, audio and other media in the classroom	2.92	Proficient
58. Teach students to use various multimedia materials for the reports and class Presentations	3.08	Proficient
General Mean	3.00	Proficient

Table 18 shows that teachers can use appropriately slide presentations, videos, audio and other media in the classroom; and can teach students to use various multimedia materials for the reports and class presentations independently but they require guidance at times. This is displayed by the grand mean of 3.00 which is interpreted as proficient.

Table 19. Standard 3: Conduct open and flexible learning environments where technology is used to support a variety of interactions among students, cooperative learning and peer instruction.

Indicators	Mean	Qualitative Description
59. Use various synchronous and asynchronous communication tools (email, chat, white boards, forum, blogs)	2.89	Proficient
60. To facilitate cooperative learning and exchange of ideas and information	2.92	Proficient
General Mean	2.91	Proficient

It is evident in Table 19 that teachers are proficient in using various synchronous and asynchronous communication tools (email, chat, white boards, forum, blogs) and in facilitating cooperative learning and exchange of ideas and information. Generally, their ICT skills are proficient. This is shown by the general mean of 2.91. Meaning, they can perform independently but they require guidance at times.

Table 20. Standard 4: Evaluate usage of ICT integration in the teaching-learning process and use results to refine the design of learning activities.

61. Design rubrics for assessing student performance in the use of various technologies	3.05	Proficient
62. Use electronic means of administering quizzes and examinations	2.59	Proficient
63. Analyze assessment data using spreadsheets and statistical applications	2.32	Basic
Grand Mean	2.66	Proficient

In Table 20, it is displayed that Item 63 yielded that lowest rating of 2.32. This is qualitatively described as basic. Meaning, teachers can analyze assessment data using spreadsheets and statistical applications with guidance of an ICT expert. On the other hand, they can design rubrics for assessing student performance in the use of various technologies and they can use electronic means of administering quizzes and examinations independently but they require guidance at times. This is shown by the rating of 3.05 and 2.59 respectively. They are described as proficient. Generally, teachers are categorized as proficient in performing the skills indicated in Table 20. This is evidently shown by the mean of 2.66.

Table 21. Standard 5: Use computers and other technologies to collect and communicate information to students, colleagues, parents, and others.

Indicators	Mean	Qualitative Description
64. Use emails, group sites, blogs, etc. for disseminating information directly to students, colleagues and parents	2.92	Proficient
65. Use emails, group sites, blogs, etc. to collect information and feedback directly from students, colleagues and parents	3.11	Proficient
Grand Mean	3.11	Proficient

Data in Table 21 show that science teachers can use emails, group sites, blogs, etc. for disseminating information directly to students, colleagues and parents and can use emails, group sites, blogs, etc. to collect information and feedback directly from students, colleagues and parents independently but they require guidance at times. This is shown by the general mean of 3.11 which is qualitatively described as proficient.

Table 22. Standard 6: Apply technology to facilitate a variety of appropriate assessment and evaluation strategies recognizing the diversity of learners.

Indicators	Mean	Qualitative Description
66. Explore the use of electronic assessment tools like on line testing, submission of projects via email or on line facilities	2.92	Proficient
67. Set up online databases or repositories of student works	2.62	Proficient
Grand Mean	2.77	Proficient

Table 22 reveals that the level of ICT of teachers is proficient as shown by a general mean of 2.77 which is qualitatively described as proficient. Meaning, teachers can explore the use of electronic assessment tools like on line testing, submission of projects via email or on line facilities and can set up online databases or repositories of student works independently but require guidance at times.

2.4 Domain D: Professional

Competency Descriptor: This domain includes competencies related to professional growth and development, research, innovation and collaboration.

Table 23. Standard 1: Proactively engage in exploring and learning new and emerging technologies.

Indicators	Mean	Qualitative Description
68. Identify educational sites and portals suitable to their subject area	2.68	Proficient

69. Join online communities, subscribe to relevant mailing lists and online journals	2.70	Proficient
70. Review new and existing software for education	2.41	Basic
71. Recommend useful and credible web sites to colleagues	2.65	Proficient
Grand Mean	2.61	Proficient

Table 23 shows that Item 70 yielded the lowest rating of 2.41 which is described as basic. This indicates that teachers can review new and existing software for education with guidance. However, they can identify educational sites and portals suitable to their subject area, they can join online communities, subscribe to relevant mailing lists and online journals and they can recommend useful and credible web sites to colleagues independently but require guidance at times. These are shown by means of 2.68, 2.70 and 2.65. These are all qualitatively described as proficient. Generally, they can perform independently but require guidance at times. This is shown by a general mean of 2.61 which is described as proficient.

Table 24. Standard 2: Continuously evaluate and reflect on the use of technology in the profession for development and innovation.

Indicators	Mean	Qualitative Description
72. Conduct research on the use of technology in the classroom	2.38	Basic
73. Follow online tutorials or online degree programs	2.41	Basic
74. Actively participate in online forums and discussions	2.46	Basic
Grand Mean	2.41	Basic

Table 24 displays that teachers have basic skills in all indicators in standard 2 of domain D. Generally, the mean is 2.41 which is qualitative described as basic. Meaning, teachers can conduct research on the use of technology in the classroom, can follow online tutorials or online degree programs, and can actively participate in online forums and discussions with the guidance of an ICT expert.

Table 25. Standard 3: Share experiences and expertise, and collaborate with peers and stakeholders in advancing the use of technology in education and beyond.

Indicators	Mean	Qualitative Description
75. Publish (formal /informal) research on the use of ICT in education	2.38	Basic
76. Share lesson plans, worksheets, templates and teaching materials through course web sites	2.11	Basic
Grand Mean	2.24	Basic

In table 25, it is shown that teachers have basic skills in publishing (formal/informal) research on the use of ICT in education and in sharing lesson plans, worksheets, templates and teaching materials through course web sites with the guidance of an ICT expert. These are shown by the means of 2.38 and 2.11 which are described as basic. Generally, the skill of teachers is described as basic with the mean if 2.24.

3. Summary of Levels of ICT Skills of Science Teachers by Domain

Table 26: Level of ICT Skills in Domain A (Technology Operations and Concepts).

Standards	Mean	Qualitative Description
Standard 1	3.08	Proficient
Standard 2	2.86	Proficient
Standard 3	2.85	Proficient
Standard 4	2.70	Proficient
Grand Mean	2.87	Proficient

It is shown in the table that in all standards of domain A, the level of ICT skills of teachers is proficient as shown by their means. Generally, the level of ICT skills of teacher in domain A is proficient. This is shown by a mean of 2.87 which means that teachers can perform independently but require guidance at times.

Table 27: Level of ICT Skills in Domain B (Social and Ethical).

Standard	Mean	Qualitative Description
Standard 1	2.50	Proficient
Standard 2	2.82	Proficient
Standard 3	3.01	Proficient
Standard 4	2.83	Proficient
Grand Mean	2.79	Proficient

It is shown in Table 27 that in all standards of domain B, the level of ICT skills of teachers is proficient as shown by their means. Generally, the level of ICT skills of teachers in domain B is proficient. This is shown by a mean of 2.79 which means that teachers can perform independently but require guidance at times.

Table 28: Level of ICT Skills in Domain C (Pedagogical).

Standard	Mean	Qualitative Description
Standard 1	2.61	Proficient
Standard 2	3.00	Proficient
Standard 3	2.91	Proficient
Standard 4	2.66	Proficient
Standard 5	3.11	Proficient
Standard 6	2.77	Proficient
Grand Mean	2.84	Proficient

Table 28 displays that teachers have proficient skills in all standards of domain C. Generally, the mean is 2.84 which is qualitatively described as proficient. Meaning, teachers can perform independently but they require guidance at times.

Table 29: Level of ICT Skills in Domain D(Professional).

Standard	Mean	Qualitative Description
Standard 1	2.61	Proficient
Standard 2	2.41	Basic
Standard 3	2.24	Basic
Grand Mean	2.42	Basic

Table 29 reveals that teachers have basic skills in all standards of domain D. Generally, the mean is 2.42 which is qualitative described as basic. This implies that science teachers can perform ICT skills with the guidance of an ICT expert.

Table 30. Overall Level of ICT Skills of Science Teachers

Domain	Mean	Qualitative Description
Domain A	2.87	Proficient
Domain B	2.79	Proficient
Domain C	2.84	Proficient
Domain D	2.42	Basic
Grand Mean	2.73	Proficient

Table 30 shows that in domains A, B, and C; teachers have proficient skills. While in domain D, they have basic skills. These mean that teachers can perform skills in domains A, B, and C independently but they require guidance at times. While in domain D, they can perform the skills indicated in domain D with guidance of an ICT expert. Generally, science teachers' level of ICT skills is proficient as shown by a mean of 2.73. Meaning, results of this study show that science teachers, who are the respondents of this research study, can perform ICT skills independently but require guidance of an ICT expert at times.

IV. SUMMARY OF FINDINGS

In terms of the respondents' demographic profile, 35.14% of the respondents of this study are in the age range of 50 years old and older and 86.49% of them are female. The 42.11% of teachers who participated in this study have units in Master's Degree and have completed their academic requirements while none of the respondents was able to have a Doctoral Degree. For the last three years, there were 73% of the teachers who were able to attend an ICT trainings ranging from 1 to 3 times. Generally, all respondents either owned or have access to gadgets or ICT resources. 89.19% of the teachers own or have access to 1 to 3 gadgets /ICT resources while the remaining 10.81% possess or have access to at least 4 gadgets/ICT resources.

The findings of the study revealed that the level of ICT skills of science teachers in all standards of Domain A (Technology Operations and Concepts), Domain B (Social and Ethical), and Domain C (Pedagogical) is proficient. This is shown by the means of Domains A, B, and C which are 2.87, 2.79, and 2.84 respectively. In proficient level, teachers here can perform ICT skills independently but require guidance at times. On the other hand, the level of ICT skill of science teachers all standards of domain D (Professional) is basic with a mean of 2.42. This means that teachers can perform ICT skills with the guidance of an ICT expert. There are also some indicators in domains A, B, and C where the level of ICT skills of science teachers is basic. Generally, the level of ICT skills science teachers is proficient. Meaning, they can perform ICT skills independently but require guidance at times.

V. CONCLUSION

As revealed in the result of this study, science teachers are generally proficient in performing or conducting an ICT skill. Generally, they can perform the skills independently. But, they still need guidance from ICT experts from time to time. The primary target is to make all teachers ICT literate and make them reach the advanced level where they can perform ICT skills independently without the guidance of an ICT expert. However, this study showed that there are few indicators or skills that science teachers perceived that they are still in the basic level in terms of performing or conducting such skills. We can deduce here that teachers need training for these few indicators first then later additional ICT trainings might be conducted to further enhance their ICT skills from proficient to advanced level. Attention must be given to these few indicators which were rated basic before conducting trainings to elevate their skills to a much higher level. It can be concluded further that there is a need for enhancement of ICT skills of science teachers in those indicators or competencies, thus ICT training is needed.

VI. RECOMMENDATION

Findings of this study may be used by other schools to further enhance the ICT skills of their teachers. Similar research may be conducted by other schools by adjusting some parameters to fit to their contexts or situations. Other researchers can utilize the results of this study as reference of similar researches they wish to conduct in the near future. In light of the findings of this study, there is a need to conduct an ICT training to further enhance the skills of science teachers. Thus, the author of this action research recommends that the proposed ICT training should be conducted to the science teachers of KNCHS-JHS. The ICT training shall include all indicators which was rated basic by the respondents.

ACKNOWLEDGMENT

The researcher extent of gratitude begins with praise and thanksgiving to the Almighty God, the Creator of heaven and the earth and the source of everything.

The author is grateful to the following:

- Dr. Noemi B. Silva, his professor in Management of Curriculum and Instruction for her guidance and motivation in undertaking this study; and for reviewing and editing the research report.
- Leah, his wife, for her boundless support and understanding towards his professional development.
- AB, CD, and EF, his kids, for giving him inspiration and reasons to go on pursuing post-graduate studies.
- His PhD classmates, for sharing their knowledge, wisdom, and presence in many unforgettable precious moments of learning together in their PhD Journey.
- Researchers' friends and family, for the support given throughout his career.
- His colleagues; who acted as respondents of this study, for their cooperation and for sharing their precious time.

REFERENCES

- [1] Caluza, L. J., et.al. (2017, March). An Assessment of ICT Competencies of Pulic School Teachers: Basis for Community Extension Program. Leyte, Tacloban, Philippines.
- [2] Commission On Information And Communications Technology-National Ict Competency Standard (Nics). (N.D.). Retrieved Aigust 01, 2020 from <https://www.slideshare.net/ischoolwebboard/national-ict-competency-standards-for-teachers>
- [3] Ghavifekr, S., et. al. (n.d.). Teaching and Learning with ICT Tools: Issues and Challenges from Teachers' Perceptions. Malaysian Online Journal of Educational Technology, 38-57.
- [4] Kamaruddin, K., Abdullah, C. A. C., Idris, M. N., & Nawi, M. N. M. (2017, 10 03). Teachers' level of ICT integration in teaching and learning: A survey in Malaysian private preschool. Perak, Malaysia.
- [5] Noor-Ul-Amin, S. (n.d.). An Effective use of ICT for Education and Learning by Drawing on Worldwide Knowledge, Research, and Experience: ICT as a Change Agent of Education(A literature review). Kashmir.

Author Profile



Cyril Francisco Forro

He is the Head of the Science Department of Koronadal National Comprehensive High School-Junior High School. He completed his Master of Arts in Education major in Educational Management degree from the Notre Dame of Marbel University, Alunan Avenue, Koronadal City. He is currently studying Doctor of Philosophy in Educational Management at Notre Dame of Marbel University.