



A Workbook in Information and Communication Technology (ICT) for Grade Nine (9) Students of the Gordon Heights National High School

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Abstract—To develop and validate an ICT workbook in Computer Hardware Servicing (CHS) for Grade 9 students. The study used a descriptive research design with questionnaires and interviews as data-gathering tools. Respondents included students, teachers, and expert validators. The workbook was based on TESDA competency standards and DepEd ICT learning modules and teacher's guides. Data were analysed to determine its validity and acceptability. The developed workbook was found to be highly acceptable and valid. It covered the most difficult, most needed, and most interesting topics in CHS. Validators rated it highly in terms of content, organization, clarity, and instructional design. It improved student engagement, participation, and comprehension. Teachers reported increased efficiency in teaching due to the organized and ready-to-use activities. The workbook also addressed the lack of instructional materials, particularly hard copies of ICT modules. The study concludes that the developed ICT workbook is an effective instructional material that enhances both teaching and learning. It is recommended for use in Grade 9 ICT classes to improve efficiency, effectiveness, and student learning outcomes.

Index Terms—Workbook, Development, Computer Hardware Servicing (CHS), instructional materials, Information and Communication Technology.

1. Introduction

Technology has become an essential part of modern education by improving communication, providing easy access to information, and making learning more interactive and engaging. It also helps students develop creativity, critical thinking, and problem-solving skills that are necessary in today's world. However, global issues such as unequal access to technology, unreliable online information, and limited digital literacy must be considered when creating workbooks and learning materials. To ensure effective learning for all students, educational resources should be inclusive, accessible, and designed to address these challenges while promoting responsible use of technology.

In the Philippines, the education system has responded to this global trend through the implementation of the K to 12 curriculums, which integrates Information and Communication Technology (ICT) under Technology and Livelihood Education (TLE). Despite this initiative, several national concerns remain,

particularly the shortage of instructional materials such as textbooks, modules, teaching guides, and ICT resources. These challenges affect the quality of instruction and limit students' opportunities to fully develop ICT competencies.

At the local level, Gordon Heights National High School in Olongapo City experiences similar issues. Students encounter difficulties in learning ICT, particularly in Computer Hardware Servicing, due to limited access to printed modules and supplementary instructional materials. Many rely on photocopies, which are not always affordable or accessible. These conditions highlight the need for practical and accessible instructional materials such as workbooks to support effective teaching and learning.

The study is conducted to address the lack of instructional materials in ICT. Since ICT is a skill-based subject, students need sufficient practice and hands-on activities to fully understand the lessons. A workbook can serve as a useful supplementary material that provides structured exercises and enhances learning. The development of a validated workbook will support both teachers and students in achieving learning objectives.

This study is beneficial to various stakeholders. Students will gain improved understanding and skills in ICT through structured learning activities. Teachers will have an additional instructional tool to enhance lesson delivery and student engagement. Parents will better understand their role in supporting their children's learning. School administrators can use the findings to improve instructional materials and policies. Curriculum planners may use the workbook as a guide in developing future materials, while government officials may recognize the need to provide sufficient resources. Future researchers may use this study as a reference for similar research.

Specifically, this study aims to determine the need for a workbook among Grade 9 students in ICT, identify which lessons are considered the most difficult and the most interesting, and select appropriate lessons from the existing learning modules to be included in the workbook. It also seeks to identify the essential ICT topics that are most needed by the students and ensure that these are incorporated into the

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proposed material. Furthermore, the study aims to establish a systematic process for validating the developed workbook to ensure its effectiveness, relevance, and alignment with the curriculum.

2. Materials and Methods

A. Research Design

To produce a functional and effective workbook, the researcher made use of the Descriptive Research Methodology with the questionnaire and interview as the principal tools for the data gathering. Descriptive research methodology is concerned with the condition of relationship that exist; practices that prevails; beliefs; process that are going on; effects that are being felt or trend that are developing (Sanchez, 1998). It is indeed appropriate to use this method for the study.

The Purposive sampling was used for this research study. This has definite target population, those who were involved in the study. The respondents, the ICT Grade Nine (9) students of the Gordon Heights National High School (GHNHS), were chosen on the basis of knowledge of the information desired and accessibility of the researcher who is teaching in Grade 9.

B. The Respondents and Location

There were two sets of respondents, the Grade 9 students and the ICT Teachers.

The first set of respondents in the study were Grade Nine (9) students of Gordon Heights National High School (GHNHS) enrolled in the school year 2015-2016. The Grade Nine (9) students were composed of 80 students. As the one of their areas of specialization in Technology and Livelihood Education, student-respondents involved in this study were currently enrolled as Grade 9 students taking Computer Hardware Servicing (CHS).

The researcher also included the data gathered from three (3) Teachers who are knowledgeable and who teach ICT in the Gordon Heights National High School. The questionnaires were validated by the three (3) ICT Teachers form the Olongapo City National High School and one (1) technical specialist from the TESDA.

The school has improved a lot through the collaborative efforts of the city government officials, barangay officials and the added effort of the Parent Teachers Association (PTA) and school administration and faculty.

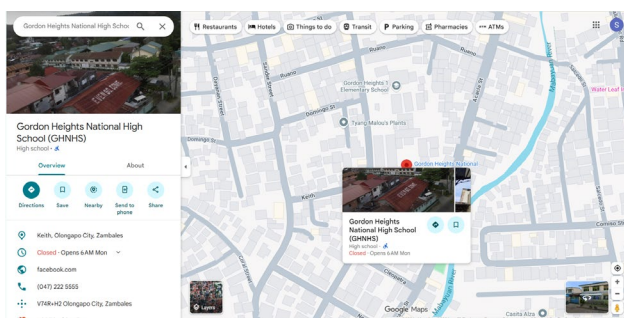


Fig. 2. A map showing the location of the study

C. The Instrument

The questionnaire was the main instrument used in gathering data. This was supplemented by direct observation and interview of students, teachers and school administrators who were involved in the program.

The questionnaire was developed by Pabalinas (2000) and Pajarillo (2014) and was modified by the researcher. It consisted of five questions namely,

1. Is there a need to have an ICT workbook?
2. Which among the lessons are difficult to study? Most interesting?
3. What are the lessons in the textbook that should be included in the workbook?
4. Which topics in ICT are considered very much needed by the respondents and will be included in the workbook?
5. How will the workbook be validated?

There were two sets of questionnaires, one for student-respondents and another set for ICT teacher-respondents.

The researcher also conducted formal interview with ICT teachers to ask and clarify some items about the topics that were relevant to the preparation of the workbook.

D. Validation of the Instrument

Since the instrument was utilized by Pabalinas (2000) and Pajarillo (2014). Only minor revisions in terms of ICT were needed and further validated by the experts in Information Technology particularly in Computer Hardware Servicing such as ICT teachers and technical specialist of the TESDA.

E. Data Collection

Data needed for this study were gathered by sending a letter of request to the Division Schools Superintendent through the Principal with recommendations from the research adviser of the graduate school seeking permission to administer the questionnaire and conduct interviews to the teachers and students at the targeted school.

After the approval of the letter of request, the researcher coordinated with the Public Schools District Supervisors (PSDS) and the School Principal of the laboratory school on the possible schedule for the administration of the test question to the students. The researcher also conducted an interview with the ICT Teachers and Technical Specialist and asked permission for the validation of the instruments.

The questionnaires were administered to students and ICT teachers, and the collected data were tallied, analyzed, and interpreted using appropriate tools. The results were then used in the development of the ICT workbook, following a systematic process that included assessing the need for the workbook, determining its format, analyzing content, selecting relevant topics, and preparing the first draft. The workbook was further improved through validation by experts and revisions based on their feedback, resulting in the final version.

F. Data Analysis

A Likert Scale was utilized in this research. According to Christian Vanek (2012). "In all Likelihood, you have used a Likert Scale (or something you have called Likert scale) in a

survey before. It might surprise you to learn that Likert scales are very specific format and what you have been calling Likert may not. Be not to worry-researchers that have been doing surveys for years still get their definition confused. In fact, many researchers do not even agree on the best way to report on the numeric values in a Likert scale. A "Lickert Scale" is the sum of responses to several Likert items. These items are usually display with a visual aid, such as a series of a balanced on both sides of neutral option, creating a less biased measurement. The actual scale labels, as well as numeric scale, may vary."

After computing the weighted average of each topic, the values were interpreted and described using a Likert scale, where 4.5–5 was classified as "Most Needed," 3.5–4.49 as "Needed," 2.5–3.49 as "Slightly Needed," 1.5–2.49 as "Very Much Needed," and 1–1.49 as "Not Needed."

3. Result and Discussion

Table 1 shows the topics/concept in ICT that were covered by the students. Majority of the students (79 or 98.75%) said that they were able to cover Computer System, Devices and Peripheral, 78 or 97.50% were able to cover Materials, Tools, Equipment and Testing devices; 77 or 96.25% for Personal Entrepreneurial Competencies-PECs; 75 or 93.75% for Computer Application Software; 72 or 90% for Safety Precautions; 70 or 87.50% for Safety Measures: OHS Policies and Procedures; 69 or 86.25% for System Specification; 59 or 73.75% for Network; 58 or 72.50% for Environment and Market (EM); 57 or 71.25% for Understanding Computer; 55 or 67.75% for Installation of Hardware Components and Other Peripherals; 52 or 65% for Diagnosing Computer Systems; 51 or 63.25% for Computer System Assembly and Disassembly; 43 or 53.75% for Computer System Errors; 41 or 51.25% for Basic Computer System and Network Configurations. Over-all, 50 or 60.94% of the topics were covered and 30 or 37.51% of the topics are not yet discussed.

Based on the analysis and interview of the researcher on the student respondents, topics were not yet discussed because of the following reasons: there were classes interruption like school and division meetings, weather disturbances, seminars and training attended by the ICT teachers on the school days, student factors because ICT specialization is composed of heterogeneous type of learners, the distribution and conduct of the survey questionnaire were within the first week of Third Quarter or first week of December 2014 and absenteeism of student/s. Grade 7 and Grade 8 ICT teachers discussed only exploratory and introductory topics.

These findings are supported by related literature emphasizing the importance of instructional materials in ensuring full topic coverage. Pajarillo (2014) found that structured workbooks in Computer Education help students better understand lessons by guiding them through concepts and activities, thereby improving the delivery of ICT content. Similarly, Bilbao (2012) stressed that supplementary instructional materials such as workbooks play a vital role in curriculum implementation by providing structure and reinforcing lessons, which can help address gaps when some topics are not fully discussed.

Table 2 shows the topics/concept in ICT that were covered by the ICT teachers. Three (3) of them came from the Olongapo National High School, three (3) from the Gordon Heights National Height School and one from the TESDA Technical Specialist with a total of seven (7) ICT Teachers/Specialists. Five (5) or 77.97% of the topics were covered by the ICT teachers and two (2) or 22.03% of the topics are not yet discussed.

The teacher-respondents said that they were able to cover Personal Entrepreneurial Competencies-PECS (100%), Environment and Market (EM) (100%), Understanding Computer (100%), Safety Measures: OHS Policies and Procedures (100%), System Specification (100%), Network (71.43%), Computer System, Devices and Peripheral (100%),

Table 1
Topics/concept in ICT that were learned by the students in the classroom

No.	Topics	No (No)	No (%)	Yes (No)	Yes (%)
I	Computer System, Devices and Peripheral	1	1.25	79	98.75
II	Materials, Tools, Equipment and Testing Devices	2	2.5	78	97.5
III	Personal Entrepreneurial Competencies (PECs)	3	3.75	77	96.25
IV	Computer Application Software	5	6.25	75	93.75
V	Safety Precautions	8	10	72	90
VI	Safety Measures: OHS Policies and Procedures	10	12.5	70	87.5
VII	System Specification	11	13.75	69	86.25
VIII	Network	21	26.25	59	73.75
IX	Environment and Market (EM)	22	27.5	58	72.5
X	Understanding Computer	23	28.75	57	71.25
XI	Installation of Hardware Components and Peripherals	25	31.25	55	68.75
XII	Diagnosing Computer Systems	28	35	52	65
XIII	Computer System Assembly and Disassembly	29	36.25	51	63.75
XIV	Computer System Errors	37	46.25	43	53.75
XV	Basic Computer System and Network Configurations	39	48.75	41	51.25
XVI	Basic Computer Configuration Set-up	40	50	40	50
XVII	Basic Concept of Electricity	45	56.25	35	43.75
XVIII	Installing Application/Operating System	47	58.75	33	41.25
XIX	Basic Network Errors	47	58.75	33	41.25
XX	Troubleshooting Computer System Network	50	62.5	30	37.5
XXI	Techniques for Testing Computer System	51	63.75	29	36.25
XXII	Error Beep Codes	55	68.75	25	31.25
XXIII	Replacing and Upgrading Components	56	70	24	30
XXIV	Award BIOS/CMOS Setup	69	86.25	11	13.75

Table 2
Topics/concept in ICT that were discussed by the teachers

No.	Topics	No	% No	Yes	% Yes
I	Personal Entrepreneurial Competencies (PECs)	0	0	7	100
II	Environment and Market (EM)	0	0	7	100
III	Understanding Computer	0	0	7	100
IV	OHS Policies and Procedures	0	0	7	100
V	System Specification	0	0	7	100
VI	Network	2	28.57	5	71.43
VII	Computer System, Devices and Peripheral	0	0	7	100
VIII	Installation of Hardware Components and Other Peripherals	1	14.29	6	85.71
IX	Computer System Software	1	14.29	6	85.71
X	Diagnosing Computer Systems	1	14.29	6	85.71
XI	Replacing and Upgrading Different Components	1	14.29	6	85.71
XII	Materials, Tools, Equipment and Testing Devices	2	28.57	5	71.43
XIII	Installing Operating System	2	28.57	5	71.43
XIV	Basic Computer Configuration Set-up	2	28.57	5	71.43
XV	Safety Precautions	2	28.57	5	71.43
XVI	Basic Computer System and Network Configurations	2	28.57	5	71.43
XVII	Computer System Assembly and Disassembly	2	28.57	5	71.43
XVIII	Computer System Errors	3	42.86	4	57.14
XIX	Basic Concept of Electricity	3	42.86	4	57.14
XX	Techniques for Testing Computer System	3	42.86	4	57.14
XXI	Troubleshooting Computer System Network	3	42.86	4	57.14
XXII	Basic Network Errors	3	42.86	4	57.14
XXIII	Award BOS/CMOS Setup	3	42.86	4	57.14
XXIV	Error Beep Codes	3	42.86	4	57.14
	Mean	2	22.03	5	77.97

Table 3
Top five topics the students found difficult to study

Rank	Topics	Frequency (N=80)	Percentage (%)
1	Computer System Assembly and Disassembly	23	28.75
2	Materials, Tools, Equipment and Testing Devices	19	23.75
3	Computer System Error	12	15
4	Installation of Hardware Computer and Other Components	11	13.75
5	Diagnosing Computer System	10	12.5

Installation of Hardware components and other peripherals (85.71%), Computer Application Software (85.71%), Diagnosing Computer Systems (85.71%), Replacing and Upgrading Different Components (85.71%), Materials, Tools, Equipment and Testing Devices (71.43%); Installing Operating System (71.43%), Basic Computer Configuration Set-up (71.43%), Safety Precautions (71.43%), Basic Computer System and Network Configurations (71.43%), Computer System Assembly and Disassembly (71.43%), Computer System Errors (57.14%), Basic Concept of Electricity (57.17%), Techniques for Testing Computer System (57.14%), Troubleshooting Computer System Network (57.14%), Basic Network Errors (57.14%), Award BOS/CMOS Setup (57.14%) and Error Beep Codes (57.14%).

The ICT teacher-respondents were composed of one (1) from Grade 7, one (1) from Grade 8, two (2) from Grades 9, two (2) from Grade 10 and one (1) Technical Specialist. The two Grade 10 teachers and one technical Specialist already reviewed and discussed all (100%) the topics which are included in the first and second core competencies of Competency-Based Curriculum of TESDA. All (100%) ICT teacher-respondents were able to cover Personal Entrepreneurial Competencies-PEC's, Environment and Market (EM), Understanding Computer Personal Entrepreneurial Competencies-PECS, Safety Measures: OHS Policies and Procedures; Computer System, Devices and Peripheral and Safety Precautions which are included in the introductory part of ICT from Grade 7 to

Grade 10 levels. These were discussed during Grade 7 and Grade 8 as their Exploratory and introductory course. These were also included in basic and common competencies of Competency-Based Curriculum (CBC) of TESDA.

These findings are supported by related literature emphasizing the importance of instructional materials such as workbooks in ensuring effective lesson delivery and topic coverage. Pajarillo (2014) found that structured workbooks in Computer Education significantly improve students' understanding by providing guided activities that help teachers systematically deliver lessons. This suggests that the availability of structured materials may contribute to the higher percentage of topics covered by teachers. Similarly, Bilbao (2012) emphasized that supplementary instructional materials such as workbooks play a crucial role in curriculum implementation by providing structure and reinforcing lessons, which can help teachers ensure that required competencies are discussed.

Moreover, workbook development initiatives in DepEd (2015) show that teacher-developed instructional materials can address gaps in resources and improve lesson delivery, while Faustino et al. (2013) pointed out that traditional textbooks often lack interactive activities. This highlights the need for more engaging materials, such as workbooks, to support ICT teachers in achieving more comprehensive topic coverage.

Table 3 shows the top five topics that the students found difficult to study. Out of 80 student-respondents 23 or 28.75%

Table 4
The top five topics that the teachers found difficult to teach

Rank	Topics	Frequency (N=7)	Percentage (%)
1	Troubleshooting computer system network	5	71.43
3.5	Computer System and Network Configurations	2	28.57
3.5	Techniques for Testing Computer System	2	28.57
3.5	Basic Network Errors	2	28.57
3.5	Error Beep Codes	2	28.57
5	Computer System Error	1	14.28
5	Network	1	14.28
5	Basic Computer Configuration Set-up	1	14.28
5	Replacing and Upgrading Different Components	1	14.28
5	Award BOS/CMOS Setup	1	14.28
5	Computer System Assembly and Disassembly	1	14.28

of them found "Computer System Assembly and Disassembly" as the most difficult topic to study, 19 or 23.75% for the topic "Materials, Tools, Equipment and Testing devices", 12 or 15.00% "Computer System Error", 11 or 13.75 for "Installation of Hardware Computer and Other Components"; and 10 or 12.50% for the topics "Diagnosing Computer System".

Based on the interviews and observation, the students found the above said topics as difficult since there was a need for familiarization of different color code of computer ports and cable connectors, learners were not able to practice at home because they had personal unit; video presentations were presented by ICT Teachers for discussion only, there were inadequate testing equipment because of lack of fund, computer system error like beep codes that are composed of different beeps depending on the software or hardware failure. It needs intense listening to identify the failed components. Some of the system error codes are not applicable to some unit depending on the BIOS Program and some are also depending on the technological advancement of the computer system. It also included the difficulty to identify the specification of the computer components because some did not include the specification label. Student factor is also included as a factor that made the topics difficult because classes were composed of heterogeneous learners that some would not be able to grasp the lessons.

If the methods of teaching applied in Information Technology applied is direct instruction strategy, it is a teacher-directed method, which means that the teacher stands in front of a classroom and presents the information. It is a telling and showing method performed usually by a teacher or a trained student while the rest of the class become observers.

Certain problems occur during giving instructions and that process is significant. Tools are needed but there is inadequate testing equipment like in networking and testing equipment. If the technology used or being discussed is sometimes expensive or is not available in the laboratory, this could be discussed by showing illustrations of the said equipment. It could be a computer visualization. However, learners were not engaged in the process. According to David Kolb's Experiential Learning, learners actively involved in a concrete experience. Edgar Dale (Educational Media, 1960), often cited as the father of modern media in education, developed, from his experience in teaching and his observations of learners, "the cone of experience". The lowest degree of abstraction is direct. Purposeful experience refers to the concrete and firsthand experiences that makes up the foundation of learning. According to Dale, 90% retention

rate level is acquired through the combination of "hearing, saying and doing". Therefore, it is implied that to minimize the difficulty for the students in ICT, they must be actively engaged in the lesson and not merely observers.

Table 4 shows the top five topics that the teachers found difficult to teach. Out of 7 ICT teachers five (5) or 71.43% of them found the topic "Troubleshooting Computer System Network" as the most difficult topic to teach, two (2) or 28.57% of "Computer System and Network Configurations", 2 or 28.57% for "Techniques for Testing Computer System", two (2) or 28.57% for "Basic Network Errors" and two (2) or 28.57% for "Error Beep Codes", 1 or 4.28% for Computer System Error, Network, Basic Computer Configuration Set-up, Replacing and Upgrading Different Components, Award BOS/CMOS Setup and Computer System Assembly And Disassemble respectively.

According to the ICT Teachers, they found the above topics were difficult to teach because classroom strategies and techniques should be changed because of the heterogeneous learners, there were inadequate testing equipment due to lack of resources or fund, and computer system error like beep codes that composed of different beeps depending on the software or hardware failure. It needed intense listening to identify the failed components. Some of the system error codes were not applicable to some units depending on the BIOS Program and some were also depending on the technological advancement of the computer system.

A Teaching Theory behind technology education is called constructivism published by McLeod (2015); it argues that teachers generate knowledge and meaning from an interaction between their experiences and their ideas. Technology can sometimes hinder learning and the educational process of learners because of some issues like inadequate testing equipment. The teacher is not able to actualize the proper use of material because of its absence or due to differences and advancement of computer system that the teacher's especially on computer beeps codes cannot effectively teach. Hence, learning by doing cannot be affected.

Table 5 shows the top 5 topics that the students found most interesting.

Out of 80 student-respondents, the topic "Computer System, Devices and Peripheral" ranked 1 since 18 or 22.50% student-respondents chose it as the most interesting; 14 or 17.50% included "Computer System Assembly and Disassembly"; 11 or 13.75% for "Computer Application Software", Installing Operating System and Network respectively; and 9 or 11.25%

Table 5
Top five topics the students found most interesting

Rank	Topics	Frequency (N=80)	Percentage (%)
1	Computer System, Devices and Peripheral	18	22.5
2	Computer System Assembly and Disassembly	14	17.5
4	Computer System Software	11	13.75
4	Installing Operating System	11	13.75
4	Network	11	13.75
5	Materials, Tools, Equipment and Testing Devices	9	11.25

Table 6
Top 5 topics that the ICT teachers found most interesting

Rank	Topics	Frequency (N=7)	Percentage (%)
1	Computer System Assembly and Disassembly	4	57.14
2	Installation of Operating System	3	42.86
4	Installation of Computer Hardware System	2	25
4	Computer Application Software	2	25
4	Troubleshooting computer system network	2	25
5	Computer System and Network Configurations	1	14.29
5	Techniques for Testing Computer System	1	14.29
5	Basic Computer Configuration Set-up	1	14.29
5	Computer Systems, Devices and Peripheral	1	14.29
5	Materials, Tools, Equipment and Testing Devices	1	14.29
5	Network	1	14.29

for Materials, Tools, Equipment and Testing devices.

Computer System, Devices and Peripherals rank 1 as most interesting since it was already included during their exploratory or introductory course, the others were hands-on experience on computer system which made learners were equipped with technology more and enthusiastic to learn about computers.

Students found them interesting to study because they were engaged in the lesson. According to Bruner believes that students must be active, they must identify key principles for themselves rather than simply accepting teacher's explanations. The process is called Discovery Learning. Since students encounter real life situation, it can be a preparation for solving real life problems. It also removes shyness or fear as the learners have to handle computer system, devices and peripherals, and develop skills in the use of that equipment. It also promotes motivation, trust, source of joy and encouragement to learners because they are actively involved in the activities. The students can apply reflective discussion that encourage students to think and talk about what they have observed, heard or read in doing with the computer system.

Table 6 shows the top 5 topics that the ICT teachers found most interesting. Out of 7 ICT teachers,

the topic "Computer System Assembly and Disassembly" ranked one (1) since four (4) or 57.14% ICT teachers chose it as the most interesting one; for rank 3, three (3) or 42.86% included "Installation of Operating System"; for rank 2, 2 or 25.00% included "Installation of Computer Hardware System", "Computer System Software" and "Troubleshooting Computer System Network" respectively. Rank 5 are "Computer System and Network Configurations", "Techniques for Testing Computer System", "Basic Computer Configuration Set-up", "Computer Systems, Devices and Peripheral", "Materials, Tools, Equipment and Testing Devices" and "Network" with weighted mean of 1 or 14.29%.

Teachers found them most interesting because the strategies that the teacher could apply was indirect instruction. It was mainly student-centered and topics involved were more on

performance-based approach. In indirect instruction, the role of the teacher shifted from lecturer/director to that of facilitator, supporter, and resource person. The teachers arranged the learning environment, provided opportunity for student involvement, and, when appropriate, provided feedback to students while they conducted the inquiry.

Teachers also found them interesting because they were challenging for them like troubleshooting computer system network. Problem-solving approach helped students to think critically and analyze the problem. It focused on knowing the issues, considering all possible factors, and finding a solution to the problems in computer systems.

Furthermore, related literature indicates that workbooks enhance critical thinking and problem-solving skills, which are essential in challenging ICT topics such as troubleshooting computer systems and networks. Pelayo (2015) noted that well-designed workbooks promote independent learning and encourage students to analyze problems, making them more engaged in the learning process. This aligns with the teachers' preference for topics that involve problem-solving and critical thinking. In addition, Tabbada and Buendia (2015) highlighted that instructional materials tailored to learners' needs improve both teaching strategies and student outcomes, particularly when activities are inquiry-based. Browne (2015) also supported that workbooks reinforce lessons and guide students in applying concepts, which is important in ICT tasks that require diagnosing and solving technical issues. These studies confirm that workbooks not only address the shortage of instructional materials but also support the effective teaching of complex, performance-based ICT topics.

Table 7 shows the degrees of need of the topics in ICT that should be included in the proposed workbook with their weighted mean and corresponding ranking. They were described as 5 as the "Most Needed"; 4 as "Very Much Needed"; 3 as "Difficult"; 2 as slightly needed; and 1 as "Not Needed".

The top one described as "most needed" was "Computer System Assembly and Disassembly" with a weighted mean of

Table 7
Degrees of need of the topics in ICT that should be included in the proposed workbook

Rank	Topics	Mean	Description
1	Computer System Assembly and Disassembly	4.71	Most Needed
2	Computer System, Devices and Peripheral	4.46	Very Much Needed
3	Installation of Hardware Components and other peripherals	4.41	Very Much Needed
4	Computer Application Software	4.4	Very Much Needed
5	Installing Operating System	4.26	Very Much Needed
6	Error Beep Codes	4.24	Very Much Needed
7	Safety Precautions in Diagnosing Computer Systems	4.21	Very Much Needed
8	Replacing and Upgrading Different Components	4.18	Very Much Needed
9.5	Computer System Errors	4.13	Very Much Needed
9.5	Troubleshooting computer system network	4.13	Very Much Needed
11	Diagnosing Computer Systems	4.11	Very Much Needed
12	Basic Computer System and Network Configurations	4.06	Very Much Needed
13	Basic Network Errors	4.05	Very Much Needed
14	Materials, tools, equipment and testing devices	3.95	Very Much Needed
15	Basic Computer Configuration Set-up	3.93	Very Much Needed
15	Techniques for Testing Computer System	3.9	Very Much Needed
16	Award BOS/CMOS Setup	3.75	Very Much Needed
17	OHS Policies and Procedures	3.7	Very Much Needed
18	Network	3.69	Very Much Needed
19	System Specification	3.68	Very Much Needed
20	Understanding Computer	3.63	Very Much Needed
21	Personal Entrepreneurial Competencies (PECs)	3.49	Needed
22	Basic Concept of Electricity	3.44	Needed
23	Environment and Market (EM)	3.24	Needed

Table 8
Degree of need of the topics in ICT that should be included in the proposed workbook according to the ICT teachers

Rank	Topics	Mean	Description
2.5	Installing Application/Operating System	5	Most Needed
2.5	Basic Computer Configuration Set-up	5	Most Needed
2.5	Troubleshooting computer system network	5	Most Needed
2.5	Basic Computer System and Network Configurations	5	Most Needed
6.5	Installation of Hardware components and other peripherals	4.86	Most Needed
6.5	Safety Precautions in Diagnosing Computer Systems	4.86	Most Needed
6.5	Computer System Errors	4.86	Most Needed
6.5	Diagnosing Computer Systems	4.86	Most Needed
9	Computer Assembly and Disassembly	4.8	Most Needed
10	Computer Application Software	4.71	Most Needed
11	Computer System, Devices and Peripherals	4.67	Most Needed
12.5	Materials, tools, equipment and testing devices	4.57	Most Needed
12.5	Techniques for Testing Computer System	4.57	Most Needed
14.5	Replacing and Upgrading Different Components	4.43	Very Much Needed
14.5	Basic Network Errors	4.43	Very Much Needed
16	Network	4.29s	Very Much Needed
18	Basic Concept of Electricity	4	Very Much Needed
18	Award BOS/CMOS Setup	4	Very Much Needed
18	Error Beep Codes	4	Very Much Needed
20	OHS Policies and Procedures	3.86	Very Much Needed
21	System Specification	3.71	Very Much Needed
23	Personal Entrepreneurial Competencies (PECs)	3.57	Very Much Needed
23	Environment and Market (EM)	3.57	Very Much Needed
23	Understanding Computer	3.57	Very Much Needed

4.71. The topics that were described as very much needed were "Computer System Devices and Peripherals" with a weighted mean of 4.46; "Installation of Hardware Components and other Peripherals," with weighted mean of 4.41; "Computer System Software" with a weighted mean of 4.40; "Installing Operating System" with "Error Beep Codes" with a weighted mean of 4.24; "Safety Precautions in Computer System" with a weighted mean of 4.21; "Replacing and Upgrading Different Components" with a weighted mean of 4.18; "Components and Troubleshooting Computer System Network" with weighted mean of 4.13. All of the remaining topics were described also as "very much needed" except the three topics which were described as "needed" that included "Personal Entrepreneurial Competencies (PECs)" with weighted mean of 3.49; Basic Concept of Electricity with weighted mean of 3.44; and

"Environment and Market (EM)" with weighted mean of 3.24.

The topic Computer System Assembly and Disassembly was the most needed topic since it integrated all the concepts and topics that were included in the learning module. In this topic the teacher could determine the acquired knowledge and skills of the learner in the entire academic year. Browne (2015) said, "it tests students' knowledge of key area and useful as teaching guide for technology teachers."

Table 8 shows the degree of need of the topics in ICT that should be included in the proposed workbook according to the ICT teachers. They were presented with their weighted mean and corresponding ranking. They were described as 5 as the "Most Needed"; 4 as "Very Much Needed"; 3 as "Difficult"; 2 as slightly needed; and 1 as "Not Needed".

The topics that were selected as "most needed" were

"Installing Operating System", "Basic Computer Configuration Set-up", "Troubleshooting Computer system Network" and "Basic Computer System" and "Network Configurations" with a weighted mean of 5.0. The topics that were described also as "" with weighted mean of 4.86 were "Installation of Hardware Components and Other Peripherals", "Safety Precautions in Computer System", "Computer System Errors" and "Diagnosing Computer Systems". "Computer System Assembly and Disassembly" with weighted mean of 4.80; "Computer System Software" with a weighted mean of 4.71; "Computer System, Devices and Peripherals weighted as 4.67; "Materials, Tools, Equipment and Testing Devices" and "Techniques for Testing Computer System" both with a weighted mean of 4.57. The remaining topics were described as "very much needed".

4. Conclusion and Recommendation

The study concluded that there is a clear and urgent need for a workbook as a supplementary instructional material in ICT, particularly for Grade 9 students, as it addresses both the most difficult and most interesting topics identified by teachers and students. These topics, especially those related to computer systems and networks, are essential for developing the competencies required in Computer Hardware Servicing and for passing the National Certification II (NC II). The findings emphasize that such a workbook is very much needed to enhance student engagement, support performance-based learning, and improve understanding of technical concepts. Furthermore, the validation of the workbook by ICT teachers and TESDA specialists confirms its relevance, accuracy, and usefulness, making it a valuable and effective resource in strengthening ICT instruction.

Based on these findings, it is recommended that the workbook be used as a supplementary material in ICT classes at Gordon Heights National High School and possibly in other schools. Teachers are encouraged to use it to support lessons

and address difficult topics, while students can benefit from improved understanding and skill development. It is also suggested that the workbook undergo wider validation and be continuously improved based on feedback. Furthermore, future studies may evaluate its effectiveness, and the government is encouraged to provide more instructional resources. Future researchers are also advised to enhance the workbook by including answer keys and additional learning support materials.

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