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Maintenance and Support System for Information and Communication Technology (ICT) Resources

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ABSTRACT

The lack of technical support and maintenance impedes to the utilization of ICT resources in schools. As part of the government's commitment to achieve the goals embedded in the country's vision 2020, a number of schools have been beneficiaries of ICT facilities like computers, printers, laptops, LCD projectors, and speakers through the Department of Education Computerization Program (DCP). This descriptive-correlational research study assesses the status of the maintenance and support system of ICT resources in public elementary schools in the District of San Jose, Northern Samar, Philippines. Results revealed that school heads, ICT coordinators, and teachers were least satisfied of ICT maintenance procedure. In the same manner that the school heads, ICT coordinators and teachers support system were moderately satisfactory. There were significant differences in the maintenance procedures among the respondents particularly in replacing or repairing the faulty components and upgrading hardware and software. This concludes varied ways in which the respondents respond to the maintenance of faulty components and upgrading the hardware and software. Furthermore, difference on the technical support workload and technology integration among the three groups of respondents appeared to vary in terms of support system. The finding singles out the varied compliance of the respondents in technical support and technology integration.

INTRODUCTION

Thanks to Information and Communication Technology (ICT), governments can benefit from an effective infrastructure. ICT improves the management and operation of educational institutions, as well as the processes of learning. Countries must be able to benefit from technological developments. Rapid developments in ICT are difficult to manage for educational managers, and schools. The ICT integration in the curriculum has been designed to help cope with these developments and situations of change (Ghavifekr, & Rosdy, 2015). It helps schools to develop ICT systematically and effectively in their programs and activities (Developing and Using Indicators of ICT Use in Education, 2003). All these can be achieved through ICT facility provisions, adequate funding, and infrastructural development (Onajite, 2022). ICT offers governments a productive infrastructure. ICT also enhances the management and organization of educational institutions, and the learning processes themselves. Countries must gain from technological advancements. It is challenging for educational administrators and institutions to keep up with the rapid advancements in ICT. The use of ICT in the curriculum has been created to aid in adjusting to these advancements and situational changes (Andoh, 2012). It aids schools in developing ICT in their programs and activities methodically and efficiently (DepEd Order No. 78, s. 2010). However, the efficiency of the integration of ICT in curriculum does not depend so much on technological advances but rather on the good practices and also a set of constraints and challenges that continue to hamper the

creation, implementation of ICT-related programs and activities (Selmi, 2023).

Many schools lack internet access, and the majority of their equipment is broken and useless. Therefore, the question is how such circumstances can be avoided. Programs addressing the upkeep and support of ICT resources, particularly for elementary schools, should therefore exist to achieve this (Johnson, Jacovina, Russell, & Soto, 2016); Information and Communication Technology (ICT) in Education, 2016). Sincere observation shows that the majority of school administrators just store broken machinery or equipment in a corner. Sometimes a technician may be called in to fix the problem (Education World, n.d.). However, because no one at the school knows how to fix the computer, the technician will overcharge the institution, or worse, the technician will simply suggest that the institution buy a new one (Ten things about computer use in schools that you don't want to hear but I'll say them anyway, 2012).

This situation serves as a reminder that schools should use pertinent specialized support services as extensively as possible. When appropriate, school principals and ICT coordinators should encourage subject and classroom teachers to communicate with such services. The effective deployment of ICT in education policy is facilitated by a well-developed ICT infrastructure in the economic sector (UNESCO Report, 2004). One of numerous crucial economic methods to guarantee sustainable economic development of any country is the use of ICT in education policy (UNESCO Report, 2004). It is necessary to pay attention to technological advances for the total

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transformation in the education sector in general. In this permanent challenge, it is necessary to adapt to the digital transformation, in order to better respond to the needs and challenges of a constantly changing environment (Tamer, & Knidiri, 2023).

The researcher's concept to evaluate the level of ICT resource maintenance and support system across primary schools in San Jose District, Division of Northern Samar, Philippines, was inspired by the aforementioned citations.

MATERIALS AND METHODS

This quantitative study used a descriptive-correlational research design to identify the status of maintenance and support system for ICT resources among the elementary schools in the district. The main instrument of the study was a Survey Questionnaire, which was adapted from the study of (Ona, 2010) titled Maintenance and Support Systems for ICT Resources in State Universities and Colleges in Region III. The public elementary schools in the San Jose district's public-school system's current ICT maintenance and support system were assessed in this descriptive research investigation. This study, which demonstrated the distinction between the maintenance and support system among school responders in the district, was a correlational study.

RESULTS

Maintenance Procedure

School Heads

The indicators with the highest rating, as shown in Table 1, are "Monitoring the condition and functionality of networks and equipment, including testing website accesses and links," and "Periodic back up of stored files on a school network." The indicators with the lowest means are "Periodic replacement of parts," and "Installing and removing equipment and applications."

The data indicates that the maintenance procedure falls short of expectations. This suggests even more that not all of the conditions were fully satisfied, such as the first two lowest indicators, because it necessitates funding and appropriate training or experience on how this maintenance should be performed. The indicators with the highest rating, as shown in Table 1.1, are "Monitoring the condition and functionality of networks and equipment, including testing website accesses and links," and "Periodic back up of stored files on a school network." The indicators with the lowest means are "Periodic replacement of parts," and "Installing and removing equipment and applications." The data indicates that the maintenance procedure falls short of expectations. This suggests even more that not all of the

Table 1: Maintenance Procedure According to School Head

Specific Indicators	Mean	Response	Interpretation
1. Periodic replacement of parts	2.42	Rarely	Least Satisfactory
2. Renewal of consumable supplies	2.67	Sometimes	Moderately Satisfactory
3. Repair or replacement of faulty components	2.67	Sometimes	Moderately Satisfactory
4. Updating or upgrading hardware and software, including installing new operating system versions	2.67	Sometimes	Moderately Satisfactory
5. Periodic backup of stored files on a school network	2.75	Sometimes	Moderately Satisfactory
6. Monitoring the condition and functionality of networks and equipment, including testing website accesses and links	2.92	Sometimes	Moderately Satisfactory
7. Installing and removing equipment and applications	2.50	Sometimes	Least Satisfactory
Grand Mean	2.66	Sometimes	Moderately Satisfactory

conditions were fully satisfied, such as the first two lowest indicators, because it necessitates funding and appropriate training or experience on how this maintenance should be performed.

ICT Coordinators

According to Table 2, the indicators with the highest ratings are "Renewal of consumable supplies" and "Installing and removing equipment and applications,"

while the indicators with the lowest ratings are "Periodic back up of stored files on a school network" and "Monitoring the condition and functionality of networks and equipment, including testing website accesses and links." From the statistics, it can be concluded that the maintenance process is insufficient. The Inspectorate's (Inspectorate, 2008) conclusion that a lack of technical maintenance is a key barrier to the development of ICT in schools was confirmed by the current conclusion.

Table 2: Maintenance Procedure According to ICT Coordinators

Specific Indicators	Mean	Response	Interpretation
1. Periodic replacement of parts	2.67	Sometimes	Moderately Satisfactory
2. Renewal of consumable supplies	2.75	Sometimes	Moderately Satisfactory
3. Repair or replacement of faulty components	2.58	Sometimes	Least Satisfactory
4. Updating or upgrading hardware and software, including installing new	2.58	Sometimes	Least Satisfactory

operating system versions	2.58	Sometimes	Least Satisfactory
5. Periodic backup of stored files on a school network	2.50	Sometimes	Least Satisfactory
6. Monitoring the condition and functionality of networks and equipment, including testing website accesses and links	2.50	Sometimes	Least Satisfactory
7. Installing and removing equipment and applications	2.75	Sometimes	Moderately Satisfactory
Grand Mean	2.62	Sometimes	Moderately Satisfactory

Teachers

According to Table 3, the two indicators with the highest ratings are “Updating or upgrading hardware and software, including installing new operating system versions,” and “Renewal of consumable supplies.” In contrast, the indicators with the lowest ratings are “Monitoring the condition and functionality of networks and equipment, including testing website accesses and links,” and “Repair or replacement of faulty components.” Nevertheless,

elementary school teachers rated the overall maintenance as “satisfactory.” The findings suggest that the district’s maintenance practices were subpar, particularly when it came to replacing broken equipment. This conclusion is supported by members of the International Education Advisory (2008), who emphasize the importance of hardware, software, and maintenance. Ona (2010) disagreed with the finding that indicated the number of full-time technical.

Table 3: Maintenance Procedure According to Teachers

Specific Indicators	Mean	Response	Interpretation
1. Periodic replacement of parts	2.16	Rare	Least Satisfactory
2. Renewal of consumable supplies	2.18	Rare	Least Satisfactory
3. Repair or replacement of faulty components	2.08	Rare	Least Satisfactory
4. Updating or upgrading hardware and software, including installing new operating system versions	2.24	Rare	Least Satisfactory
5. Periodic backup of stored files on a school network	2.16	Rare	Least Satisfactory
6. Monitoring the condition and functionality of networks and equipment, including testing website accesses and links	2.04	Rare	Least Satisfactory
7. Installing and removing equipment and applications	2.18	Rare	Least Satisfactory
Grand Mean	2.15	Rare	Least Satisfactory

The district ICT maintenance received the lowest overall satisfaction ratings from the three groups of respondents, as shown in Table 4.

“Renewal of consumable supplies” and “Updating or upgrading hardware and software, including installing new operating system versions” are the indicators with the highest ratings, both of which are evaluated as being moderately satisfactory. However, “Periodic replacement

of parts” and “Repair or replacement of faulty components” are the indicators rated as least satisfactory. It can be deduced from the data that the district had poor maintenance in terms of fixing and upgrading the defective parts or units.

It also implies that the school fund is able to manage the upkeep of renewable resources and the updating of software and hardware.

Table 4: Summary Result of Maintenance Procedure

Specific Indicators	WM	Interpretation
1. Periodic replacement of parts	2.42	Least Satisfactory
2. Renewal of consumable supplies	2.53	Moderately Satisfactory
3. Repair or replacement of faulty components	2.44	Least Satisfactory
4. Updating or upgrading hardware and software, including installing new operating system versions	2.50	Moderately Satisfactory
5. Periodic backup of stored files on a school network	2.47	Least Satisfactory
6. Monitoring the condition and functionality of networks and equipment, including testing website accesses and links	2.49	Least Satisfactory
7. Installing and removing equipment and applications	2.48	Least Satisfactory
Grand Mean	2.48	Least Satisfactory

Support System School Heads

According to Table 5, the district's support system is generally rated as "moderately satisfactory," with a grand mean of 2.92. The indicators with the lowest ratings are "Technical support workload as indicated by the various

ratios of support calls to support staff, of support staff to number of computers, and of support staff to the number of users," "Help desks and other forms of putting a person to resolve a problem or provide advice," and "Automated information systems, such as searchable frequently asked questions (FAQ) databases."

Table 5: Support System (School Heads)

Specific Indicators	Mean	Response	Interpretation
1. Help desks and other forms of putting a person to resolve a problem or provide advice	3.08	Sometimes	Moderately Satisfactory
2. Automated information systems, such as searchable frequently asked questions (FAQ) databases	3.08	Sometimes	Moderately Satisfactory
3. Initial training and familiarization tours for equipment and software, whether automated or conducted by a human	2.83	Sometimes	Moderately Satisfactory
4. Instructional and curriculum integration support, usually through observation and personal interaction between a teacher and a technology coordinator	2.92	Sometimes	Moderately Satisfactory
5. Technology integration support for administrative applications, usually conducted through specialized consultants or software/systems vendors	2.92	Sometimes	Moderately Satisfactory
6. Technical support staffing as indicated by the number of persons assigned to technical support	2.83	Sometimes	Moderately Satisfactory
7. Technical support workload as indicated by the various ratios of support calls to support staff, of support staff to number of computers, and of support staff to the number of users	2.75	Sometimes	Moderately Satisfactory
Grand Mean	2.92	Sometimes	Moderately Satisfactory

ICT Coordinators

The level of support among ICT coordinators in the district is depicted in Table 6. The support system is "moderately adequate," according to the weighted mean

of 2.70, which indicates that it was modest. The table also demonstrates that the district ICT coordinators are requesting changes to the current support system, including help desks and other avenues for placing

Table 6: Support System (ICT-Coordinators)

Specific Indicators	Mean	Response	Interpretation
1. Help desks and other forms of putting a person to resolve a problem or provide advice	2.83	Sometimes	Moderately Satisfactory
2. Automated information systems, such as searchable frequently asked questions (FAQ) databases	2.83	Sometimes	Moderately Satisfactory
3. Initial training and familiarization tours for equipment and software, whether automated or conducted by a human	2.75	Sometimes	Moderately Satisfactory
4. Instructional and curriculum integration support, usually through observation and personal interaction between a teacher and a technology coordinator	2.58	Sometimes	Least Satisfactory
5. Technology integration support for administrative applications, usually conducted through specialized consultants or software/systems vendors	2.67	Sometimes	Moderately Satisfactory
6. Technical support staffing as indicated by the number of persons assigned to technical support	2.67	Sometimes	Moderately Satisfactory
7. Technical support workload as indicated by the various ratios of support calls to support staff, of support staff to number of computers, and of support staff to the number of users	2.58	Sometimes	Least Satisfactory
Grand Mean	2.70	Sometimes	Moderately Satisfactory

someone to solve an issue or offer guidance. On the contrary, they are anticipating the greatest support in terms of burden for technical support as well as support for integrating education and curriculum. Additionally, data show that although ICT coordinators are given access to help desks for their assistance, they still value ICT integration in the classroom. This outcome

Teachers

The depth of the district's teacher support network is shown in Table 7. With a weighted mean of 2.16,

satisfaction is lowest. In addition, each indicator received the lowest rating possible. The results suggest that the district's support system is usually underwhelming in the eyes of the instructors. Additionally, given that all of the teachers rated the indicators' rarity as high, it can be assumed that the ICT support requested by them is not being given adequate consideration. Meenakshi (2013) and Tondeur (2010) concur with this conclusion, stating that many teachers are hesitant to adopt ICT because of insufficient administrative assistance received by their respondents.

Table 7: Support System (Teachers)

Specific Indicators	Mean	Response	Interpretation
1. Help desks and other forms of putting a person to resolve a problem or provide advice	2.28	Rare	Least Satisfactory
2. Automated information systems, such as searchable frequently asked questions (FAQ) databases	2.19	Rare	Least Satisfactory
3. Initial training and familiarization tours for equipment and software, whether automated or conducted by a human	2.05	Rare	Least Satisfactory
4. Instructional and curriculum integration support, usually through observation and personal interaction between a teacher and a technology coordinator	2.30	Rare	Least Satisfactory
5. Technology integration support for administrative applications, usually conducted through specialized consultants or software/systems vendors	2.09	Rare	Least Satisfactory
6. Technical support staffing as indicated by the number of persons assigned to technical support	2.10	Rare	Least Satisfactory
7. Technical support workload as indicated by the various ratios of support calls to support staff, of support staff to number of computers, and of support staff to the number of users	2.09	Rare	Least Satisfactory
Grand Mean	2.16	Rare	Least Satisfactory

With a grand mean of 2.59, Table 8 depicts the district's total support system, which scored only moderately satisfactorily. The common least indicator is "Technical support workload as indicated by the various ratios of support calls to support staff, of support staff to the number of computers, and of support staff to the number of users," according to the three groups of

respondents. The common indicator with the highest rating is "Help desks and other forms of putting a person to resolve a problem or provide advice." The outcome suggests that the respondents are given guidance and support for overcoming ICT issues. However, given that there was only one ICT coordinator per school, it implies that they also need support for ICT

Table 8: Summary Result of Support System

Specific Indicators	WM	Interpretation
1. Help desks and other forms of putting a person to resolve a problem or provide advice	2.73	Moderately Satisfactory
2. Automated information systems, such as searchable frequently asked questions (FAQ) databases	2.70	Moderately Satisfactory
3. Initial training and familiarization tours for equipment and software, whether automated or conducted by a human	2.54	Moderately Satisfactory
4. Instructional and curriculum integration support, usually through observation and personal interaction between a teacher and a technology coordinator	2.60	Moderately Satisfactory
5. Technology integration support for administrative applications, usually conducted through specialized consultants or software/systems vendors	2.66	Moderately Satisfactory

6. Technical support staffing as indicated by the number of persons assigned to technical support	2.53	Moderately Satisfactory
7. Technical support workload as indicated by the various ratios of support calls to support staff, of support staff to number of computers, and of support staff to the number of users	2.47	Moderately Satisfactory
Grand Mean	2.59	Moderately Satisfactory

Test of Difference

Differences in the Maintenance Procedure According to School Heads, ICT Coordinators, and Teachers

The difference in maintenance practices among school administrators, ICT coordinators, and teachers was examined using an F-test one-way ANOVA. The computed value of $F = 8.22$ has a significance value of 0.02, which is smaller than the margin of error of 0.05, as shown in Table 9. The F value was also computed to be

8.09, less than the 0.05 margin of error with a significance value of 0.01. The null hypotheses are thus disproved, indicating that there are significant disparities between the three groups of responders, particularly in the updating or upgrading of hardware and software as well as the repair or replacement of defective components. These results demonstrate that maintenance practices among school leaders and ICT coordinators are more extensive than those among teachers.

Table 9: Difference in the maintenance procedures for ICT as rated by the respondents

Maintenance Procedures	School Heads	ICT Coordinators	Teachers	F	Sig.	Interpretation
Periodic replacement of parts	3.10	3.20	2.60	1.23	0.21	Not Significant
Renewal of consumable supplies	2.40	2.50	2.00	0.92	0.10	Not Significant
Repair or replacement of faulty components	3.80	3.10	2.20	8.22	0.02	Significant
Updating or upgrading hardware and software, including installing new operating system versions	3.90	3.40	2.10	8.09	0.01	Significant
Periodic backup of stored files on a school network	3.30	3.14	2.80	1.30	0.49	Not Significant
Monitoring the condition and functionality of networks and equipment, including testing website accesses and links	3.20	3.30	2.80	1.11	0.46	Not Significant
Installing and removing equipment and applications	3.20	3.10	2.80	0.10	0.62	Not Significant
	3.20	3.00	2.60	0.88	0.53	Not Significant

Difference in the Support System according to School Heads, ICT Coordinators, and Teachers

Calculations indicate that the null hypothesis is rejected and the alternative hypothesis is accepted when the computed value of $F = 7.54$ with a significance value of 0.01

is less than the margin of error of 0.05. According to this result, school administrators and ICT coordinators have a heavier workload than instructors when it comes to technical help. This suggests that although ICT coordinators and school administrators intended

Table 10: Difference in the support systems for ICT as rated by the respondents

Support System	School Heads	ICT Coordinators	Teachers	F	Sig.	Interpretation
Help desks and other forms of putting a person to resolve a problem or provide advice	3.11	2.60	2.78	1.22	0.23	Not Significant
Automated information systems, such as searchable frequently asked questions (FAQ) databases	2.20	2.70	2.76	0.87	0.10	Not Significant
Initial training and familiarization tours for equipment and software, whether automated or conducted by a human	2.33	3.00	2.25	1.87	0.08	Not Significant

Instructional and curriculum integration support, usually through observation and personal interaction between a teacher and a technology coordinator	2.09	2.45	2.02	1.18	0.25	Not Significant
Technology integration support for administrative applications, usually conducted through specialized consultants or software/systems vendors	3.10	2.36	1.93	5.87	0.00	Significant
Technical support staffing as indicated by the number of persons assigned to technical support	3.00	2.30	2.36	1.08	0.29	Not Significant
Technical support workload as indicated by the various ratios of support calls to support staff, of support staff to number of computers, and of support staff to the number of users	3.33	4.00	2.47	7.54	0.01	Significant

considerable technical support for teachers, it was insufficient.

Additionally, according to the computed value of $F=5.87$ with a significance of 0.00, which is less than the margin of error in 0.05, the technology integration support for administrative applications, typically provided by specialized consultants or software/systems vendors, was found to be significantly different among the three groups of respondents. By performing this calculation, the null hypothesis is rejected in favor of the alternative. It implies that the tasks of school administrators and ICT coordinators are true of technology integration, but not those of instructors. This suggests that school administrators and ICT coordinators are more concerned with issues like technology integration for administrative purposes than teachers are.

CONCLUSION

According on the study's findings, the following conclusions were made:

The least satisfied parties with the maintenance process were teachers, school administrators, and ICT coordinators, which hurt how effectively ICT was maintained. Similar to how the support systems for teachers, school administrators, and ICT coordinators were only somewhat effective, more ICT support systems are required. Hardware and maintenance methods were substantially connected. However, the software and maintenance procedure, did not appear to have any meaningful relationships. This means that ICT hardware requires more stringent maintenance than ICT software. The respondents' maintenance practices varied significantly, especially when it came to upgrading hardware and software and replacing or repairing damaged components. This brings to a close the various responses from the responders to the upkeep of broken parts and upgrading the hardware and software. Additionally, among the three groups of respondents, there appeared to be variation in the support system and workload for technical support for administrative applications. The

conclusion highlights the respondents' varying levels of compliance with regard to technical support and technological integration.

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