School Administrators' Technology Management: Paving the Way for Instructional Advancement

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ABSTRACT

Technology integration in education is essential for enhancing instruction, with school administrators playing a key role in its implementation. The technology management of school administrators and teachers and how it affects the instructional advancement of the schools. This will serve as a basis for developing a framework to design an effective technology management for instructional advancement. Using a convergent parallel design, data was gathered through surveys and interviews with administrators and teachers, employing census and purposive sampling techniques. Findings revealed that while schools have adopted technology, challenges persist, particularly in advanced schools. School administrators displayed a positive attitude toward technology but faced obstacles such as insufficient computers and infrastructure. Teachers acknowledged professional development opportunities but cited inadequate equipment, technical support, and connectivity issues as major hindrances. The study identified significant relationships between technology management and technology in schools. To address challenges, a proposed framework emphasizes improving infrastructure, resources, and maintenance.

Keywords: Technology management, Instructional advancement, Administrators

INTRODUCTION

Technology is important in the educational system as well as in the principal's role as a technology leader in enhancing teachers' performance and supporting effective technology integration into schools. School administrators need to improve their understanding of the impact of technological changes. The school administrator needs to be an effective technology leader who is capable of vision, planning, and management. Several studies dwell on technology integration from the teachers' perspective, however lacking from the school site administrators known as principal (Machado & Chung, 2015). More research is needed about the technology integration of principals in terms of organizing, enforcing the school vision and plan. The study aims to identify the experiences of school administrators and teachers in using technology towards instructional advancement. It covers how the experiences of school administrators and teachers in using technology, and how technology is assessed in schools. The study examines the technology management of school administrators and the use of technology in schools within Public Elementary Schools in the District of Guiguinto. The study utilized a mixed methods approach to use quantitative and qualitative results in explaining and interpreting the findings of the study.

Education is a means of learning about and achieving modern technologies. Technology is always present in education, but how it is accepted, adopted, and integrated into each system determines how it is used (Tomaro, 2018). Technology such as software and multimedia are used to supplement instruction and improve the

quality of teaching and learning processes, and record-keeping as it relates to non-teaching (Ajalode, 2019). Technology is particularly useful in education, some schools use it in their operation such as processing admission in schools and the processing of salaries for staff of schools. Moreover, technology usage is incorporated into school management to improve effectiveness and efficiency (Shah, 2014). The school administrators' technology management can pave the way in making instructional advancement. A lot of studies were about the technology integration of teachers in the classroom. However, there were few existing studies about technology integration of school administrators in school proving its effectiveness towards school management.

The general problem of the study is: How may the technology management of the school administrators affect the instructional advancement of their school? The study aims to describe the technology management of the school administrators and teachers and how it affects the instructional advancement of their school which serves as a basis for the development of a framework to design an effective technology management in schools for instructional advancement.

Specifically, the study sought answers to the following questions:

1. How may the technology management of school administrators in Guiguinto be described in terms of:
   1.1 motivation, knowledge, and skills required for the effective use of technology;
   1.2 infrastructure and set-up required for the use of technology in schools;
   1.3 funding provided to adapt the use of technology at schools;
   1.4 technical staff at schools for technical troubleshooting;
   1.5 number of computers available in the computer technology laboratory;
   1.6 computer technology laboratory for every subject;
   1.7 technology-related fears and efficient use of technology; and
   1.8 technology and integrating technology into the classroom?
2. How may the technology experience of teachers be described in terms of:
   2.1 technology planning and policies;
   2.2 equipment and infrastructure;
   2.3 technology applications;
   2.4 maintenance and support;
   2.5 professional development; and
   2.6 technology integration?
3. Does the technology management of school administrators affect the technology experience in school?
4. How do key informants' experiences in utilizing technology be explored in terms of:
   4.1 problems highlighted in the technology management of school administrators and teachers, and
   4.2 technology management of school administrators and teachers that affect the instructional advancement of schools?
5. What framework may be proposed to design an effective technology management in schools for instructional advancement?

A. Literature Review

The following discussions include the related literature to see its relevance in the current direction of the study. The six themes are the experiences about technology in the school.

Technology Planning and Policies. According to Chang (2014), school administrators, such as the principal, must be schooled in vision, strategy, and management to be experienced and successful technical leaders. This is the most crucial aspect of technological leadership. A vision of how technology will affect school improvement must be developed by a technological leader. The most significant responsibilities of a technology leader are planning and providing resources for staff development, followed by technology tools and infrastructure support, assessment, and research. Effective technological leaders must implement systems for assessing each teacher's progress. They must also establish technological goals and professional growth

strategies. In addition, learners and teachers were becoming increasingly tech-savvy, and some of them made research and materials readily available. There were beneficiary schools for the Decentralization Computerization Program (DCP), which was employed in the delivery of teaching to keep students and teachers up to date on current technologies.

Equipment and Infrastructure. School principals give digital age leadership and management to improve their schools constantly. This is accomplished through the efficient application of technological resources. Principals must also guarantee that the infrastructure is conducive to teaching and learning. School principals provide digital-age leadership and management to help schools enhance their performance by maximizing the use of information and technology. Principals are also responsible for maintaining the infrastructure that supports teaching and learning (ISTE, 2014). Infrastructures or the availability and accessibility to technical resources have been key impediments for schools in the Philippines, which is a developing country, to fully benefit from this huge innovation in education (Bana et al., 2016). In the Philippines, most public schools lack adequate ICT infrastructure, and the majority of teachers are not ICT savvy, resulting in low student and school performance (Lorenzo, 2016). As cited by Tomaro (2018), ICT has developed into one of the most important infrastructures that every educational institution should provide to its students. ICT refers to any type of communication equipment, including satellite systems, radios, televisions, cell phones, computers, network hardware, and software. When information and communication technologies (ICTs) are used for educational purposes, particularly to build learning environments and enhance student learning, they can be classified as a subfield of educational technology.

Technology Applications. Teachers create technology-integrated activities based on the context and employ a variety of resources, including technical gadgets and software, worksheets, discussion groups, and assessments. Teachers build activities by integrating multiple tools and circumstances, resulting in a task for students to perform in order to attain a goal (Kaptelinin, 2013). Teachers were found to have poor computer abilities and a lack of understanding of software and hardware. According to Caluza et al. (2017), the majority of the public school teachers they assessed have minimal ICT skills and need to improve. Moreover, teachers were also found to be lacking in computer knowledge and abilities for instructional reasons, as well as a lack of willingness to teach computer-related topics (Kubota et al., 2018). In the Philippines, school administrators and ICT coordinators have been found to have an impact on encouraging teachers to use tablets and other technologies (Lumagbas et al., 2019). According to Ajalode (2019), computers can be used in school management for a variety of purposes, including communications, budgeting, listing, invention, student anecdotal records, admissions, enrollment, library circulation, and public access catalog. It can also be used to store teachers, track payroll data, create a grading system for pupils, and do a variety of other tasks. Bonifacio (2013) said that it makes it easier for teachers to do duties like calculating grades, creating reports, and so on, which they previously had to do by hand. Furthermore, as cited by Shah (2014), the use of technology has made administrative work easier in terms of finances, attendance statistics, and confidential information exchange. To put it another way, school management improves effectiveness and efficiency by saving time and allowing for the development of alternate solutions to complex problems.

Maintenance and Support. Due to the educators' hectic schedules, there is no technical support staff to maintain the computers' operation and usefulness, and teachers have received very little training (Tomaro, 2018). Kubota et al. (2018) determined that teachers did not have access to training opportunities and that there was no technical support staff on-site, thus repairs or simple damage could not be rectified immediately. According to Liu et al. (2017), a large number of studies have found that the quantity and quality of technology support offered by schools is a key predictor of effective classroom technology use.

Professional Development. According to Macià and García (2016), the most important school variable influencing student achievement and promoting school quality is teacher quality. Educators should also strive to improve their professional abilities and knowledge (Marks, 2013). As cited by Cox (2013), in the process of technology integration, it was observed that collaborative support and technology training suited to varied degrees of technological proficiency were considerably helpful. A collaborative support and training environment allows educators to give and receive one-on-one feedback that drives training via the personalized

needs of instructors when technology is incorporated into their classrooms. Panda (2017) founded that the use of technology in education is the process of creating, developing, implementing, and evaluating systems and procedures for adult, continuing, and lifelong learning at all levels of education.

Technology Integration. Teachers' low computer proficiency and the lack of technology integration in the curriculum have been cited as major roadblocks to the efficient use of technology in education (Morales, 2015). This is due to the lack of a defined national vision or direction, as well as national standards to satisfy in terms of integrating technology into the Philippine educational system (Vergel de Dios, 2016). Teachers and school systems must collaborate to achieve optimal technology integration, in which innovative technology-based teaching and learning approaches are embraced and incorporated into the learning curriculum (Limon, 2015). According to Kruse and Buckmiller (2015), principals should use technology to foster technological innovation and integration to improve students' education. Technology-savvy principals boost teachers' technological literacy and enable them to incorporate technology into their classrooms.

Effective technology integration in schools involves comprehensive planning and policies to ensure its seamless incorporation into the education. This begins with strategic technology planning, where schools assess their needs and goals, aligning them with available resources. Establishing clear policies regarding technology usage and access ensures a safe and productive learning environment. Adequate equipment and infrastructure, including devices and network capabilities, are essential for facilitating modern teaching methods and student engagement. Additionally, maintenance and support systems must be in place to address technical issues promptly, minimizing disruptions to learning. Technology application spans various areas, from interactive learning tools to administrative systems, enriching both teaching and administrative processes. Continuous professional development equips educators with the skills to effectively utilize technology in their instruction, fostering innovation and adaptability. Finally, successful technology integration occurs when it becomes a part of the curriculum, enhancing learning outcomes and preparing students for the digital world.

B. Research Design

The study employed a mixed-method research approach using a convergent parallel design. Convergent Parallel design was utilized as a strategy for collecting, analyzing, and combining quantitative and qualitative methodologies in one study to gain a better understanding of the research topic (Creswell & Plano-Clark, 2011). The main premise was that combining quantitative and qualitative methodologies would yield a better knowledge of the study problem and subject than using either method alone.

The study conducted used a convergent parallel design in which the researcher employed a survey questionnaire to collect data from school administrators and teachers, while simultaneously conducting written response interviews with school administrators and teachers. The quantitative method was conducted as a survey to explore the technology management of the school administrators and technology in schools based on the experiences of the teachers, while the qualitative method was employed as a written response interview with school administrators and teachers. All paragraphs must be indented. All paragraphs must be justified, i.e. both left-justified and right-justified.

C. Population and Sample of the Study

The researcher aims to find out the technology management of school administrators and the assessment of the teachers in their experience of technology in the schools, and how the technology management of the school administrators affects the technology advancement of the schools. The actual respondents utilized in this study are the public elementary school administrators and teachers at the District of Guiguinto.

The researcher used a census technique, it is used in quantitative research to collect data from every unit in a population, providing a complete count of the population (Australian Bureau of Statistics, 2016). Moreover, the researcher set criteria for school administrators such as an elementary principal, assistant principal, head teacher, or officer-in-charge, a regular permanent from the Guiguinto District of Schools Division of Bulacan, and with 24 hours of relevant training in technological management. On the other hand, the following were

set for the teacher respondents such as regular permanent in the Guiguinto District, Schools Division of Bulacan, at least one year in service as teaching personnel, and handling TLE/EPP subjects in Key Stage 2 (Grades 4-6).

While, purposive sampling technique was used for qualitative data. This is a non-probability sampling where the researcher set descriptive criteria to select the informants among the population of the study (Abubakar, 2015). The researcher set criteria such as an elementary principal, assistant principal, head teacher, or officer-in-charge, a regular permanent from the Guiguinto District of Schools Division of Bulacan, and with 24 hours of relevant training in technological management. On the other hand, the teachers must be a public elementary teacher of the informants, regular permanent in the Guiguinto District, Schools Division of Bulacan, three years in service as teaching personnel, and ICT coordinators of the school. In line with this, the researcher conducted an online survey questionnaire to 14 school administrators and 118 public elementary teachers. Moreover, online written response interviews were conducted to 14 school administrators and 27 public elementary teachers in Guiguinto District, Schools Division of Bulacan.

D. Research Instruments

The survey form questionnaire and written response interview that the researcher used is based on the stated statement of the problem. The researcher used two (2) types of instruments in the study; (1) survey questionnaires and (2) written response interview questions for school administrators and teachers. The questionnaire for school administrators was adopted from Öznacar and Dericioğlu (2016) study entitled "The Role of School Administrators in the Use of Technology". While the questionnaire for teachers was adopted from The Institute of Education Sciences - National Center for Education Statistics (IES-NCES) (2003). The written response interview questions were about problems highlighted in the technology management of school administrators and teachers and the technology management of administrators and teachers that affect the technology advancement in the schools.

Furthermore, the researcher sought the mastery of the specific experts to make sure that the research instrument of this study has a level of validity and reliability. The questions from the written response interview were validated through content validity by the experts for its appropriateness in the study. The adapted instrument was modified based on what information needed. Experts validate the instrument to guarantee the validity, authenticity, and reliability of the result.

E. Data Processing and Statistical Treatment

In treating the data various statistical tools were used. The two survey questionnaires from school administrators and teachers were composed of various parts; part one was the profile of the respondents and part two was the technology management of the school administrators and the technology in school assessed based on the experience of the teachers. Part one is for the profile of respondents which frequency count was used while part two responds to each item on a 5-point liker-type scale (Likert scale). Likert Scale is a type of rating scale used to measure attitudes or opinions. The study employed descriptive statistical frequency as a statistical treatment for each item. Then, the mean of each item was computed including the standard deviation and verbal description. Each theme and dimension gave a verbal description based on computed weighted mean and standard deviation.

Furthermore, to determine the technology management of the school administrators, the researcher tallied, tabulated, and interpreted the responses from the survey questionnaire describing the technology management of the school administrators in different dimensions. The data were analyzed as follows:

Scale	Mean Range	Verbal Description
5	4.50 – 5.00	Very Well
4	3.50 – 4.49	Well
3	2.50 – 3.49	Adequate
2	1.50 – 2.49	Poor
1	1.00 – 1.49	Very Poor

To assess the technology in schools based on the experience of the teachers, the following scales were used:

Scale	Mean Range	Verbal Description
5	4.50 – 5.00	Highly Attained
4	3.50 – 4.49	Attained
3	2.50 – 3.49	Moderately Attained
2	1.50 – 2.49	Least Attained
1	1.00 – 1.49	Not Attained

The data gathered from the written response interviews which were done by school administrators and teachers subjected to qualitative analysis through inductive coding method.

Moreover, the correlation and influence between technology management of school administrators and technology in schools based on the experience of the teachers was identified based on the results. The researcher utilized multiple regression analysis to analyze the influence between the two variables. The researcher examined how a combination of technology management of school administrators affect the technology experience of teachers.

F. Qualitative Data Analysis

Qualitative data was collected and analyzed based on the technology management in the schools of the school administrators and teachers then interpreted the results. The data gathered from the informants' interview was written based on their responses and analyzed using Inductive Coding Method to interpret data.

Reading through the data and identifying codes, categories, patterns, and emerging themes is known as inductive analysis (Saldaña & Omasta, 2017). Codes and categories are discovered and given labels as the researcher goes through the data rather than being planned. Saldaña (2013), First-cycle coding and second-cycle coding are the two main steps of coding. The first cycle codes are those that are applied to the data at the beginning, and the data that is generated inside the first cycle codes can be subjected to second cycle codes. Stated differently, the researcher can add a second layer of coding to the first cycle's codes in the second cycle by further analyzing the first cycle's coded text. Different types of coding may be employed in each cycle.

Inductive Coding Method derived the codes from the data. It was started from scratch and creates codes based on the raw data itself. The interview was written based on the informants' responses. The informants were school administrators and teachers. The researcher identified preliminary codes based on the raw data. Afterwards, the researcher created common codes that came from the preliminary codes. The codes were described as descriptive codes and process codes. Descriptive codes are based on content-capturing concepts, while process codes identify actions or behaviors by analyzing how events unfold. The researcher also utilized IN-VIVO coding, also known as verbatim coding came from the informants' statements. Lastly, themes were created based on the common codes.

G. Results and Discussion

Part I. Technology Management of School Administrators

Table I shows the total mean of each technology management of school administrators. The standard deviation (σ) of 1.28 around a mean ($\bar{x}$) of 3.19 for technology management suggests moderate variability in perceptions among school administrators across dimensions. While the mean indicates adequacy, the (SD) σ reflects differing opinions or experiences regarding various aspects of technology management, highlighting areas with potential for improvement.

TABLE I TECHNOLOGY MANAGEMENT OF SCHOOL ADMINISTRATORS

Dimension	Total Mean	Standard Deviation	Verbal Description
1. Motivation, Knowledge, and the Skills Required for the Effective Use of Technology.	4.23	0.79	Well
2. Infrastructure and Set-Up Required for the Use of Technology in the schools.	3.48	1.04	Adequate
3. Funding Provided to Adapt the Use of Technology at schools,	3.27	1.02	Adequate
4. Technical Staff at the schools for Technical Troubleshooting.	3.29	1.20	Adequate
5. Number of Computers Available in the Computer Technology Laboratory.	2.32	1.15	Poor
6. Computer Technology Laboratory for Every Subject.	1.86	0.89	Poor
7. Technology-Related Fears and Efficient Use of Technology.	3.46	1.32	Adequate
8. Technology and Integrating Technology into the Classroom.	3.75	0.94	Well
Overall Mean	3.19	1.28	Adequate

Note: *WM* denotes Weighted Mean, *SD* denotes Standard Deviation, and *VD* denotes Verbal Description. Very Poor (1.00-1.49), Poor (1.50-2.49), Adequate (2.50-3.49), Well (3.50-4.49), Very Well (4.50-5.00).

The overall standard deviation of 1.28 revealed that the school heads' technology management in Guiguinto district is far apart from each other. The table also revealed that among the different technology management, the technology-related fears and efficient use of technology obtained the highest standard deviation which means that the response differs among different schools. Another notable standard deviation is the availability of technical staff at schools for technical troubleshooting obtained the highest standard deviation. This implies that across the different schools in Guiguinto District the availability of technical staff for trouble shooting differs the most. There are schools with available technical staff and there are those who don't. It states that school administrators' motivation, knowledge, and skills required for the effective use of technology got the highest mean which is 4.23 with a verbal description of well. This means that school heads had positive mindset toward the use of technology. Results also showed that not only were the principals willing to support the use of technology in their schools, but they were also willing to improve their knowledge, abilities, and skills to facilitate the integration of the technology.

Part II. Technology in Schools based on the Experience of the Teachers

Table II shows the total mean of each technology in the schools based on the experience of teachers. The standard deviation (σ) of 0.93 around a mean ($\bar{x}$) of 3.97 for technology attainment suggests moderate variability in teacher experiences. While the mean indicates proficiency, the (SD) σ reflects minor variations in perceptions, emphasizing a general consensus on the effectiveness of technology integration in schools.

TABLE II TECHNOLOGY IN THE SCHOOLS BASED ON THE EXPERIENCE OF TEACHERS

Themes	Total Mean	Standard Deviation	Verbal Description
1. Technology and Planning Policies	3.93	0.85	Attained
2. Equipment and Infrastructure	3.30	1.31	Moderately Attained
3. Technology Applications	3.91	0.81	Attained
4. Maintenance and Support	3.45	1.12	Moderately Attained
5. Professional Development	4.03	0.77	Attained
6. Technology Integration	3.55	1.01	Attained
Overall Mean	3.97	0.93	Attained

Note: *WM* denotes Weighted Mean, *SD* denotes Standard Deviation, and *VD* denotes Verbal Description. Not Attained (1.00-1.49), Least Attained (1.50-2.49), Moderately Attained (2.50-3.49), Attained (3.50-4.49), Highly Attained (4.50-5.00).

The overall standard deviation of 0.93 revealed that the technology in schools does not differ significantly across different schools. However, the standard deviation of 1.31 for equipment and infrastructure reveals that the equipment and infrastructure in different schools of Guiguinto District differ from each other. Different schools have different equipment and infrastructure capabilities. Some schools have more equipment, and some schools don't.

It stated that professional development got the highest weighted mean which was 4.03 with a verbal description of attained. This gives the impression that the public elementary schools attained the requirements needed for professional development. They experienced technology-related training.

On the other hand, equipment and infrastructure got the lowest weighted mean which was 3.30 with a verbal description of moderately attained. This gives the impression that the experience of teachers towards equipment and infrastructure did not meet. The lack of technology equipment and infrastructure was a hindrance to the advancement of the school. Insufficient infrastructure blocks complete integration, and a shortage of computers in classrooms limits the level of instruction available to both teachers and students (Tomaro, 2018). Moreover, maintenance and support got a mean of 3.45, and verbal description of moderately attained. This gives the impression that the experience of teachers towards maintenance and support did not meet. The inadequacy of technology maintenance and support was a hindrance to the advancement of the schools. Teachers' capacity to fully utilize technology is limited since they frequently lack of sufficient technology training and support. The absence of technical support, which was necessary for the effective integration of technology into the classroom, makes the problem even worse (Johnson et al., 2016).

Part III. Influence Between the Technology Management of School Administrators and The Technology Experience of The Teachers

Table III shows regression analysis on technology management of school administrators as factors of technology experiences of the teachers. Although the overall model is significant (R = 0.460, R2 = 0.212, SE = 0.497, $p < .05$), only 21% of the variation in the technology experiences of the teachers (dependent variable) can be explained by the technology management of the school administrators (independent variable). This means that there are 79% unexplained variance in this model which this research cannot take into account. Furthermore, none of the factors support hypothesized paths: TM1 (β = –0.323, SE = 0.402), TM2 (β = –0.208, SE = 0.125), TM3 (β = –0.257, SE = 0.267), TM4 (β = 0.043, SE = 0.212), TM5 (β = –0.496, SE = 0.157), TM6 (β = 0.685, SE = 0.231), TM7 (β = –0.317, SE = 0.537), TM8 (β = 0.697, SE = 0.338). This gives us the impression that the model may not have an adequate overall fit.

Notice also that upon comparing the standardized beta, TM6 (β = 0.685, SE = 0.231) and TM8 (β = 0.697, SE = 0.338) have the highest standardized beta. Although paths are non-significant and do not support each hypothesis, this may still give an impression that TM6: computer technology laboratory for every subject and TM8: technology and integrating technology into the classroom, somehow, are factors to consider on the variance that surrounds the dependent variable of technology experiences of the teachers only if the unexplained variance are taken into account. For TM6 and TM8, the t-values are larger (above 1), indicating stronger relationship, indicating stronger relationships. Moreover, TM6 associated p-value (0.057) is greater than alpha (0.05) but still relatively close to it. This indicates that there is a moderate probability of observing the relationship between TM6 and the dependent variable by chance. While, TM8 associated p-value (0.106) is greater than the alpha of 0.05. It is still relatively low, indicating that there is a moderate probability of observing the relationship between TM8 and the dependent variable by chance.

TABLE III TECHNOLOGY MANAGEMENT OF SCHOOL ADMINISTRATORS AS FACTORS OF TECHNOLOGY EXPERIENCE OF THE TEACHERS VIA REGRESSION ANALYSIS

Independent Variables	**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
	B	**Std. Error**	**Beta**		
TM1	-0.26	0.402	-0.323	-0.645	0.520
TM2	-0.124	0.125	-0.208	-0.986	0.327
TM3	-0.144	0.267	-0.257	-0.539	0.591

TM4	0.025	0.212	0.043	0.12	0.905
TM5	-0.245	0.157	-0.496	-1.566	0.120
TM6	0.444	0.231	0.685	1.923	0.057
TM7	-0.169	0.537	-0.317	-0.314	0.754
TM8	0.551	0.338	0.697	1.629	0.106
R = 0.460			p-value = 0.001		
R-square = 0.212			alpha = 0.05		
F-value = 3.662					

Note: N = 118, R denotes multiple R, R^2 denotes coefficient of determination, β denotes beta coefficient, SE denotes standard error. TM1: motivation, knowledge, and skills required for the effective use of technology; TM2: infrastructure and set-up required for the use of technology in schools; TM3: funding provided to adapt the use of technology at schools; TM4: technical staff at schools for the technical troubleshooting; TM5: number of computers available in the computer technology laboratory; TM6: computer technology laboratory for every subject; TM7: technology-related fears and efficient use of technology; TM8: technology and integrating technology into the classroom.

The F-value tests the overall significance of the regression model. A higher F-value indicates that the overall model is more significant. In this case, the F-value is 3.662, indicating that the model is statistically significant. Since the p-value (0.001) is less than the commonly used 0.05 (alpha), we reject the null hypothesis and conclude that there is a significant relationship between the independent variables and the dependent variable. Collectively, the table provides evidence that the model as a whole is statistically significant.

Part IV. Key Informants' Technology Experience in Schools

Moreover, the researcher used the Inductive Coding Method where the basis was the responses of the school administrators and teachers from the written response interview.

Part IV.I. Problems Highlighted in the Technology Management of School Administrators and Teachers.

Theme 1: Problems in technology that deals on the lack of equipment, infrastructure, resources and computers in the school.

TABLE IV PROBLEMS IN THE TECHNOLOGY MANAGEMENT OF SCHOOL ADMINISTRATORS NEEDED TO BE ADDRESSED.

Informants	**Common Codes**	**Theme 1**
1 – 5	D; Insufficient Equipment and Laboratory	Problems in technology that deals on the lack of equipment, infrastructure, resources, and computers in the school.
6 – 10	D; Insufficient Technology Resources	
11 – 14	D; Lack of Computers IN-VIVO; "Lack of ICT Teachers is one of the Challenges in our School"	

Note: D: Descriptive Code, IN-VIVO: Verbatim Statement

Theme 1 revealed the problems in technology management that the school administrators encountered and needed to address. Based on the descriptive codes, the researcher formulated that the problems in the technology management possessed by the public elementary schools were the following insufficient equipment and laboratory, insufficient technology resources, and lack of computers.

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Theme 2: Problems in technology that deals on the lack of equipment, infrastructure, and technical support in the schools.

TABLE V PROBLEMS IN THE TECHNOLOGY MANAGEMENT OF TEACHERS NEEDED TO BE ADDRESSED.

Informants	Common Codes	Theme 2
1 – 5	D; Insufficient Hardware and Software	Problems in technology that deals on the lack of equipment, infrastructure, and technical support in the schools.
6 – 10	D; Insufficient Support Staff and Maintenance IN-VIVO; "Limited Technical Knowledge and Skills."	
11 – 15	D; Lack of Infrastructure And Connectivity IN-VIVO; "Network Disruptions Especially During Online Trainings and Seminars."	
16 – 20	D; Unavailable Internet Connectivity	
21 – 25	D; Defective Computers	
26 – 27	D; Lack of Technical Maintenance	

Note: D: Descriptive Code, IN-VIVO: Verbatim Statement

Theme 2 revealed the problems in technology management that the teachers encountered and needed to address. Based on the descriptive codes, the researcher formulated that the problems in the technology management possessed by the public elementary schools were the following insufficient hardware and software, insufficient support staff and maintenance, lack of infrastructure and connectivity, unavailable internet connectivity, defective computers, and lack of technical maintenance. These problems were based on the experiences of teachers.

Theme 3: Impact of problems in the technology that affect mostly the instructional advancement of school such as technology advancement, skills, and school tasks.

TABLE VI EFFECTS OF THE PROBLEMS IN TECHNOLOGY MANAGEMENT TOWARDS INSTRUCTIONAL ADVANCEMENT IN SCHOOLS

Informants	Common Codes	Theme 3
1 – 5	P; Affecting Technology Skills	Impact of problems in the technology that affect mostly the instructional advancement of school such as technology advancement, skills, and school tasks
6 – 10	P; Affecting Technology Advancement IN-VIVO; "Delay to Transport of the Result of Report" IN-VIVO; "Ex. Insufficient Number of Computer Units that our Pupils and Teachers can use During their Discussions, and Pupils were Able to do or Explore the Advance Technology that may Help them Improve in their Skills in Advance Technology."	
11 – 14	P; Affecting School Tasks	

Note: P: Process Code, IN-VIVO: Verbatim Statement

Theme 3 revealed the school administrators' problems with technology management that hinder the advancement of technology in the school. Based on the process codes, the researcher concluded the effects of the problems in the technology management towards instructional advancement possessed by the public

elementary schools as the following affecting technology skills, affecting technology advancement, and affecting school tasks.

Theme 4: Impact of problems in technology management that affect mostly the instructional advancement of school such as digital skills, knowledge, tasks, and maintenance.

TABLE VII EFFECTS OF THE PROBLEMS IN TECHNOLOGY MANAGEMENT TOWARDS INSTRUCTIONAL ADVANCEMENT IN SCHOOLS

Informants	Common Codes	Theme 4
1 – 5	P; Affecting Technology Skills	Impact of problems in technology management that affect mostly the instructional advancement of school such as digital skills, knowledge, tasks, and maintenance
6 – 10	P; Affecting Computer-Related Tasks IN-VIVO; "There are Lots of Effects"	
11 – 15	P; Affecting Technical Support and Maintenance	
16 – 20	P; Affecting Digital Skills	
21 – 25	P; Affecting Students Skills IN-VIVO; "Struggle to Keep Pace with Advancements in Educational Technology"	
26 – 27	P; Lacking Knowledge and Skills IN-VIVO; "Unable to Produce 21st Century Skills"	

Note: P: Process Code, IN-VIVO: Verbatim Statement

Theme 4 revealed the teachers' problems with technology management that hinder the advancement of technology in the school. Based on the process codes, the researcher concluded the effects of the problems in the technology management towards instructional advancement possessed by the public elementary schools as the following affecting technology skills, affecting computer-related tasks, affecting technical support and maintenance, affecting digital skills, and lacking knowledge and skills.

Part IV.II. Technology Management of School Administrators and Teachers that Affect the Instructional Advancement in School

Theme 5: Advantages of using technology that mostly affects the instructional advancement in school such as making transactions, tasks, and presentations easily.

TABLE VIII ADVANTAGE OF USING TECHNOLOGY THAT AFFECT THE INSTRUCTIONAL ADVANCEMENT IN SCHOOL.

Informants	Common Codes	Theme 5
1 – 5	D; Accomplish Task Easily P; Producing Skilled Learners	Advantages of using technology that mostly affects the instructional advancement in school such as making transactions, tasks, and presentations easily.
6 – 10	D; Easy Way of Transactions and Communications IN-VIVO; "None at all." IN-VIVO; "Our School may be Technology Advance in Filing of Documents, like the Permanent Records of Pupils that is Very Important, Backup of Files, Reports and Documents in the School Operations, etc."	

	IN-VIVO; "Technology Advancement Ensures Improved Accuracy, Paperless Communications, Can Save Lifetime Documents"	
11 – 14	D; Makes Interactive Presentations IN-VIVO; "You Cannot Coup to the Present Demand"	

Note: D: Descriptive Code, P: Process Code, IN-VIVO: Verbatim Statement

Theme 5 revealed the public elementary school administrators' technology management they had encountered in their schools. Based on the descriptive and process codes, the researcher formulated that the technology management possessed by the public elementary school principals where the following accomplish task easily, producing skilled learners, easy way of transactions and communications, and makes interactive presentations.

Theme 6: Advantages of using technology that mostly affects the instructional advancement in school such as affecting technology skills, tasks, teaching-learning process, and learning strategies.

TABLE IX ADVANTAGE OF USING TECHNOLOGY THAT AFFECT THE INSTRUCTIONAL ADVANCEMENT IN SCHOOL.

Informants	**Common Codes**	**Theme 6**
1 – 5	P; Enhancing Technology Skills	Advantages of using technology that mostly affects the instructional advancement in school such as affecting technology skills, tasks, teaching-learning process, and learning strategies
6 – 10	P; Simplifying Teachers Tasks IN-VIVO; "There are Lots of Effects"	
11 – 15	P; Influencing Teaching-Learning Process IN-VIVO; "Use Technology to Build Skills in Areas Such as Math, Spelling, and Reading'	
16 – 20	P; Simplifying Teachers Tasks	
21 – 25	P; Adapting 21st Century Skills	
26 – 27	P; Integrating Learning Strategies IN-VIVO; "Supports the Implementation of Blended Learning"	

Note: P: Process Code, IN-VIVO: Verbatim Statement

Theme 6 revealed the public elementary school teachers' technology management they had encountered in their schools. Based on process codes, the researcher formulated that the advantages of technology based on the public elementary teachers were the following enhancing technology skills, simplifying teachers' tasks, integrating teaching-learning strategies, and adapting 21st century skills.

Theme 7: Factors of effective technology in the instructional advancement such as managing school files, reports, efficient output, and doing tasks easier.

TABLE X EFFECTIVENESS OF TECHNOLOGY IN INSTRUCTIONAL ADVANCEMENT

Informants	**Common Codes**	**Theme 7**
1 – 5	P; Helping in Managing School Files and Other Reports IN-VIVO; "Very Much"	Factors of effective technology in the instructional advancement such as managing school files, reports, efficient output, and doing tasks easier

6 – 10	P; Affecting Efficient Output and Records IN-VIVO; "School Heads Can Focus More on Supervisory Tasks to Improve Performance."	
11 – 14	P; Doing Tasks Easier and Faster	

Note: P: Process Code, IN-VIVO: Verbatim Statement

Theme 7 revealed the public elementary school administrators' instructional advancement they had encountered in their schools. Based on the process codes, the researcher categorized the technology management based on how effective technology is in the advancement of their school.

Theme 8: Factors of effective technology in the instructional advancement such as making tasks easier and independent, quality documents, supervisory tasks, and doing presentations.

TABLE XI EFFECTIVENESS OF TECHNOLOGY IN INSTRUCTIONAL ADVANCEMENT

Informants	**Common Codes**	**Theme 8**
1 – 5	P; Making Task Easier	Factors of effective technology in the instructional advancement such as making tasks easier and independent, quality documents, supervisory tasks, and doing presentations
6 – 10	P; Managing Teachers Tasks Easily	
11 – 15	P; Making Quality Documents	
16 – 20	P; Managing Supervisory Tasks	
21 – 25	P; Making Tasks Independently	
26 – 27	P; Doing Presentations Faster	

Note: P: Process Code

Theme 8 revealed the public elementary teachers' technology advancement they had encountered in their schools. Based on the process codes, the researcher formulated that the effective technology in the advancement of school possessed by the public elementary teachers were making task easier, managing teachers tasks easily, making quality documents, managing supervisory tasks, making tasks independently, and doing presentations faster.

Theme 9: Effect of School Administrators technology skills that deals mostly in instructional advancement such as eases workload, efficient and quality administrative tasks, and making tasks independently.

TABLE XII EFFECTS OF SCHOOL ADMINISTRATORS TECHNOLOGY SKILLS IN THE INSTRUCTIONAL ADVANCEMENT

Informants	**Common Codes**	**Theme 9**
1 – 5	D; Eases Workload IN-VIVO; "A Technology Savvy School Head Inspires the Seasoned Teachers to Learn About It, The New Teachers to Improve and the Students to be Motivated to Venture into High-Tech Learning"	Effect of School Administrators technology skills that deals mostly in instructional advancement such as eases workload, efficient and quality administrative tasks, and making tasks independently.

6 – 10	D; Efficient and Quality Administrative Tasks	
11 – 14	D; Make Technology Related Tasks Independently IN-VIVO; "If the Principal Himself Doesn't Know How to Use Technology He Will Not Coup to the Present Demand and Will be Beyond Among the School Personnel Which Will be the Opposite of Being Expected to Him."	

Note: D: Descriptive Code, IN-VIVO: Verbatim Statement

Based on the descriptive codes, the researcher formulated that the technology skills affect the advancement of school possessed by the public elementary school administrators were the following it eases workload, efficient and quality administrative tasks, and make technology related tasks independently.

Theme 10: Effect of School Administrators technology skills that deals mostly in instructional advancement such as tracking teachers' skills, supporting technical maintenance, doing tasks effortlessly and independently, implementing distance learning, and be technology leaders.

TABLE XIII EFFECTS OF SCHOOL ADMINISTRATORS TECHNOLOGY SKILLS IN INSTRUCTIONAL ADVANCEMENT

Informants	**Common Codes**	**Theme 10**
1 – 5	P; Tracking Teachers Skills	Effect of Administrators technology skills that deals mostly in instructional advancement such as tracking teachers' skills, supporting technical maintenance, doing tasks effortlessly and independently, implementing distance learning, and be technology leaders
6 – 10	D; Technology Leaders	
11 – 15	P; Supporting Technical Maintenance	
16 – 20	P; Managing Administrative Tasks Effortlessly	
21 – 25	P; Making Technology Tasks Independently	
26 – 27	P; Implementing Distance Learning IN-VIVO; "Stay Updated on Emerging Educational Technologies"	

Note: D: Descriptive Code, P: Process Code, IN-VIVO: Verbatim Statement

Theme 10 revealed the effect of the public elementary school administrators' technology skills on instructional advancement based on the teachers' responses. Based on the descriptive and process codes, the researcher categorized the effect of technology skills on the advancement of the school.

Part V. Synthesis of the Convergent Parallel Mixed Method Design

The proposed framework is based on the lowest mean of the survey questionnaire and the problems encountered by the school administrators and teachers. It is evident that technology management was seen in public elementary schools but to make it advance there should be a requirement that needed to be attained.

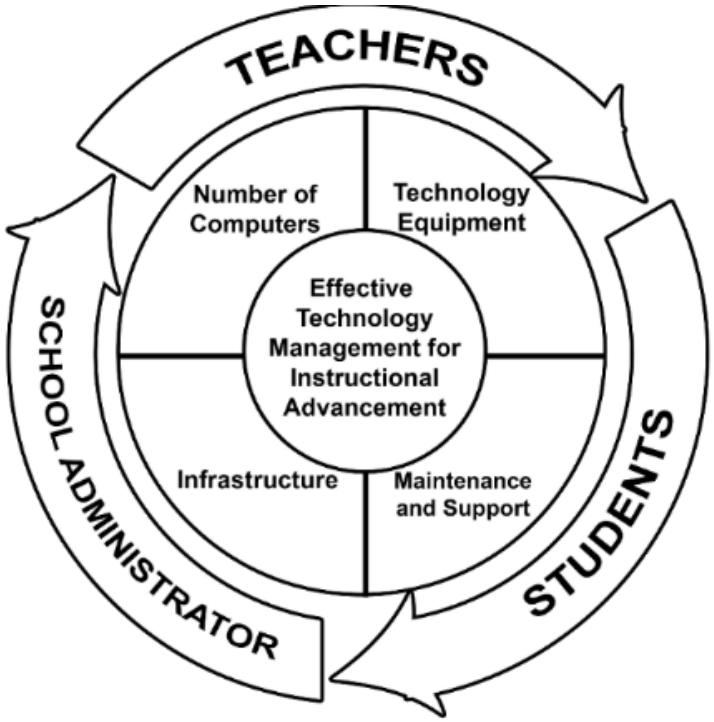
The data from survey and written response interviews were compared and analyzed. These were the bases of the proposed framework for the advancement of schools. In the technology management of school administrators, two dimensions got the lowest mean with the verbal description of poor: *Number of Computers Available in the Computer Technology Laboratory*, and *Computer Technology Laboratory for Every Subject*.

While in Technology in Schools Assessed Based on the Experience of Teachers, two themes got the lowest mean with the verbal description of moderately attained: *Equipment* and *Infrastructure*, and *Maintenance and Support*. On the other hand, based on the written response interview the problems highlighted in the technology management of school administrators and teachers were: *Lack of Computers, Inadequate Computer Laboratory, Insufficient Technology Resources Such As Hardware and Software, Lack of Internet Connectivity, and Lack of Technical Support and Maintenance.*

The following are the most noticeable factors that the school must improve such as: number of computers, technological equipment, infrastructure, maintenance and support. To have advanced technology management, these factors must be improved. The schools experience sufficient technology management, however, to be able to be an advanced school, all levels of technology management must be achieved.

Part VI. Proposed Framework of Effective Technology for Instructional Advancement

Figure 1. Proposed Framework of Effective Technology Management for Instructional Advancement.



The proposed framework is based on the lowest mean of the survey questionnaire and the problems encountered by the school administrators and teachers. It is evident that technology management was seen in public elementary schools in Guiguinto, however, to be able to be an advanced school, all levels of technology management must be achieved.

The figure represents the proposed framework that revolves around effective technology management for school advancement where the school administrators, teachers, and students experience the technology in schools.

The following are the most noticeable factors that the school must improve. To have advanced technology management, these factors must be improved: number of computers, technological equipment, infrastructure, maintenance and support.

The number of computers must improve so the schools cannot be left behind with the proper knowledge and skills. The more computers are used, the more students and teachers will be accompanied. It will empower school principals, teachers, and students with skills for the digital age. Furthermore, technological equipment must be considered because without the technology resources and supplies, the total advancement of the

organization will not be implemented. These technological components are important in accomplishing technology-related tasks. Moreover, a conducive and well-equipped infrastructure is needed, where the technology tasks and activities occur. The access to a computer laboratory provides students with adequate technology skills. In addition, maintenance and support are needed for the advancement of the school. Computers must be checked and repaired to maintain their usefulness. A technical staff or an ICT teacher must be present in school so that the technologies are properly maintained.

The arrows circling the effective technology management represent the school administrator, teachers and students in the school. They were the ones who were involved in using technology. They will benefit from effective technology management. It is noticeable that it is interconnected to each other.

It is important to remember that the cycle of the goals represents the continuous use of technology through the initiative of school administrators to learn, apply, and use technology. The teaching-learning process will also be affected. Furthermore, teachers will also learn to use technology in class and reports. Then, students will gain knowledge and skills in using technology.

CONCLUSIONS

To capsulate all the significant results of the conducted research study, the following conclusions were drawn:

1. Most of the dimensions attained the requirement needed for school administrators' technology management, and only two dimensions in technology management needed to improve for instructional advancement such as number of computers available in the computer technology laboratory, and computer technology laboratory for every subject.
2. Most of the aspects of technology attained the requirement needed for technology experience of teachers at schools, while the equipment and infrastructure, and maintenance and support needed to improve for the instructional advancement.
3. Collectively, there was a significant influence between the technology management of school administrators and the technology experience of teachers in school.
4. The problems highlighted in the technology management of school administrators and teachers were lack of computers, inadequate computer laboratory, insufficient technology resources such as hardware and software, lack of internet connectivity, and lack of technical support and maintenance.
5. The study helps public elementary schools to address the factors in technology management and focus on the four factors that have been discovered to be able to have a more advanced school such as number of computers, technological equipment, infrastructure, maintenance and support.

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