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Research Article

Technological Leadership of School Heads and Teachers' Technology Integration: Basis for the Development of a Training Program

Elenette B. Maala*, Fidelito D. Lagos

Graduate School, Marikina Polytechnic College Marikina City, Philippines

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**Corresponding author:*
E-mail:
elenettemaala09@gmail.com

ABSTRACT

Covid-19 pandemic saw the transition to online distance learning of the education in the Philippines. This became a challenge to both the teachers and heads of the educational institutions in terms of adapting and utilizing technology for better delivery and effective learning of students. The study aimed to determine the level of technological leadership of school heads. Using surveys and tests of collected data, it was revealed that the level of technological leadership of school heads based on technology innovation, technology assessment, technology forecasting, technology management and technology transfer shows a high overall weighted mean. These results showed that the technological leadership of school heads met the quality requirement of becoming technology leaders. Comparing this on teachers' technology integration using z and t- test, the study also showed that both groups have similar insights regarding the level of technological leadership. The results and conclusions served as basis for developing a training program necessary to further address the needs of school heads and teachers.

Keywords*: leadership, technology, technological integration*

Introduction

In this fast-changing digital era, technology plays a foremost part in leadership and management especially to education sectors. The working environment especially in the time of pandemic has gradually been dominated by a lot of technological developments and progressions. As educational leaders, it is significant to highlight on improving effectiveness and efficiency particularly on techno-learning and other web-based applications that have considerably changed the traditional modality of engaging education.

Integrating technology into practice is the most important thing that one can do that will lead to success of managers who aspire to be leaders. With the use of latest technology tools, it is very easy for leaders to lead employees and achieve organizational goals. Leadership in education should successfully integrate technology in the learning events. This should not only be observed as moving the way teaching and learning are managed but changing the mindsets and approach that we have about the way we contemplate about learning and teaching processes. Consequently, direction and management in

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schools must involve technological advancement well in order to reap the benefits of it and augment efficiency Drucker (2019).

The participants' leadership was examined using McRel's change management process as a theoretical framework. Qualitative interviews and observations were used as part of the research methodology. A main component analysis was performed using a quantitative survey. Principals who proactively set a vision, supplied resources, established strong lines of communication, and rigorously managed the new process generated supportive cultures that encouraged creativity and student-centered learning, according to the findings. Managing change and communicating with stakeholders were two factors that aided technology.

The junior high schools of the Schools Division Office of Marikina are protagonists of changing and developing a learner centered schools where knowledge and environments are equipped with technological advancement and development and does teachers especially the school heads must be fully prepared with such technological leadership skills in order to meet the mandate and goals of the fourth industrial revolution particularly in education.

More so, in this fast-changing digital based leadership, it is vital to develop programs that would address the needs of the constituents, teachers, learners and stakeholders of the school community. This study is integral for technological leadership and management since it will bring the new e-leadership styles path model for binding firm by developing the techno-leaders in enhancing the school philosophy and digital capacities.

Hence, the researcher being challenged with changing, enhancing, and developing learners would like to help the school heads through techno-leadership drive and responsiveness on technological innovations by defining their needs through development of a training program where measures and applications are highly considered and empowered. Similarly, being challenged with the necessities in technology expertise, the researcher is highly encouraged in pursuing this study through research.

Statement of the Problem

This study aimed to determine the technological leadership level of school heads and teachers' technology integration to serve as basis for the development of a training program during the school year 2021-2022.

Specifically, it sought answers to the following questions:

1. What is the level of technological leadership of school heads as perceived by the school heads themselves and the teachers in terms of the following dimensions:
   a. technology innovation,
   b. technology assessment,
   c. technology forecasting,
   d. technology management; and
   e. technology transfer?
2. Is there a significant difference between the perceptions of the two groups of respondents on the level of technological leadership?

Significance of the Study

Learners. They will be the definitive recipients of the study since any enhancement in the technological leadership of school heads and teachers' technology integration will result to their improved academic performance.

Teachers. The findings of the study will serve as appreciated contributions to them in the effective facilitation of technology integration among them.

School Heads. The outcome of the study can be used as their basis in planning the learning and development needed by them for their improvement and enhancement of their leadership in the aspect of technological skills.

Training planners. This study offers a design of policy guidelines on the skills training programs anchored on the technological leadership and technology integration.

Future Researchers. Lastly, this study will serve as a guide for the future researchers to discover other variables related to technological leadership and teachers' integration.

Scope and Delimitation of the Study.

This study is focused on the school heads' technology leadership and teachers' technology integration of the schools division office Marikina which can be a basis for the development of a training program.

The study was limited to seventy-two (72) school heads and one hundred eighty-two (182) teachers of selected public junior high schools namely; Sta. Elena High School, Malanday National High School, Barangka National High School, Sto.

Niño National High School and Tañong High School in district I of the Schools Division Office (SDO) - Marikina during the school year 2021 – 2022.

Related Literature

One of the essential components of the research is swotting the literature to let the researcher understand the purposes and objectives as well as its agreeing hypotheses of the study. It is a vital facet of research problem as it is a step of scientific method; it forms the basis upon which all the future work is to be built. The researcher conducted a thorough examination of the literature that had a direct influence on the current study in order to build a foundation for accurately defining the research problem, relevant data interpretation, and comparisons between parallel studies.

In today's connected society, when everything is dependent on technology, it is more crucial than ever to ensure that devices are always online and working. With a simple monitoring system, you can provide proactive help and earn your customers' lifetime loyalty. Technology monitoring is the practice of remotely monitoring and managing technology across several locations to ensure that it is always online and operational. Network and technology monitoring is a powerful yet simple technique to give an amazing experience to the distant sites that you service (Boomtown, 2019).

Students' learning styles are shifting as a result of their continual usage of technology. Artificial intelligence (AI) is transforming the way material is delivered. Traditional schools must continually adjust to be relevant as new educational models emerge. In the AI age, leadership is about allowing others to lead and create systems for learning groups. This method involves digital transformational leadership, which is a shift in leadership thought that applies to both empowered learning and self-organized learning environments (SOLEs) in educational institutions. The unique changes and unanticipated problems that must be tackled with a mix of caution and openness must be taken into account. To keep students' attention, teachers must invent, develop, and execute novel learning approaches. It is insufficient to just create areas of technology innovation in classrooms. Leaders in school must also have a digital revolution approach in place to foster a philosophy of creativity and association that will improve students' learning needs and prepare them to be leaders in an era where Artificial Intelligence is part of the educational system

According to Okeke (2019), working with teachers and encouraging them toward enhancing educational processes is an essential notion in educational management. It also entails harnessing instructors' abilities and potentials and adapting them toward educational goals, or, to put it another way, enhanced teaching and learning. Thus, leadership is of major significance to learning and, as such, is required for better levels of school accomplishment.

Related Studies.

Aldowah et al., (2017) investigated the potential of Internet of Things in higher education, as well as how to maximize its advantages while minimizing the hazards. More work is needed to unlock the full potential of IoT systems and technology. As a result, this article examines the influence of IoT on higher education, particularly universities. IoT has the potential to transform the way universities operate and improve student learning in a variety of fields and at all levels. If carefully prepared to assure widespread and successful adoption by leadership, staff, and students, it has enormous potential for universities and other educational institutions. IoT development requires university leadership. Academics, researchers, and students are in an ideal position to drive the development of IoT systems, devices, applications, and services. Furthermore, this article presents information from a variety of research groups and businesses concerning the future of IoT in higher education over the next few years. On the other side, the Internet of Things poses significant difficulties to higher education.

Akberdina and Pushkareva (2019) concentrated on the important components of technical leadership in the fourth industrial revolution (also known as technology 4.0). Technology 4.0 (also known as "Industry 4.0") is thought to have a substantial influence on today's global economic and social growth. The fourth industrial revolution is having a huge influence on worldwide income levels and people's quality of life. Nonetheless, unlike earlier industrial revolutions, the fourth industrial

revolution is focused on the physical, digital, and biological components of economic progress (e.g. biotech technologies).

The study of Akberdina and Pushkareva is similar to the present study because both the former and the present study stresses on the key aspects of the technological leadership. It only resemblances on the matter of its impact where the former focused on the global point of information in technology utilization while the present stresses on technological leadership and integration among teachers in the perspective of a local uses.

The extent to which the notion of e-leadership has taken off as a lens through which to evaluate leadership for technology-enhanced learning (TEL) in higher education was established by Arnold and Sangra (2018). It examines 49 papers that look at both the particular notion of e-leadership and other work on leadership and organizational transformation in higher education more broadly. While none of the empirical research discovered in the literature specifically mention e-leadership, the findings suggest that theoretical publications provide a number of fascinating insights.

The findings also demonstrate the vast range of interpretations and implementations of the notion of e-leadership, highlighting the need for further clarification. The paper concludes with recommendations for more multidisciplinary research at the intersection of educational technology and educational management, with a focus on values, strategy, organization, and leadership interactions at the meso level, the economy and public policy at the macro level, and teaching and learning at the micro level, as well as research in TEL Leadership Development.

The study of Arnold and Sangra resemblances the present study because the former focused on the technology-enhanced learning (TEL) while the present stresses on the technology integration among teachers. It is only similar on the basis of e-leadership where both studies talked its significance and comprehensive use.

In the same manner, Dela Rosa (2018) set out to assess digital leadership and teacher performance in a sample of Marikina City public secondary schools throughout the 2017-2018 school year in order to develop a recommended training program. The study used descriptive research to achieve and validate the digital leadership of school administrators as well as teacher performance. The study's major goal was to characterize the nature of a scenario as it was at the time of the research and to investigate the source of a certain phenomenon. The following were the statistical treatments used: the weighted mean, t-test, Pearson r correlation

The study's main findings are as follows: 1) The level of digital leadership abilities and knowledge as perceived by Marikina School Administrators and Teachers was highly knowledgeable in terms of the five aforementioned components, as evidenced by the grand weighted mean of 4.40 and 4.38. As a result, it was inferred that they had accepted and put into effect 21st-century digital technology innovation. 2) In terms of digital citizenship, excellence in professional practice, and systemic improvement, there is no substantial difference in the level of skills and knowledge of digital leadership and teacher performance. However, the digital age learning culture and visionary leadership differ significantly. 3) During the 2017-2018 school year, the teachers' Individual Performance Commitment and Review Form (IPCRF) was highly positive. 4) School administrators and teachers have very different perspectives on digital leadership in terms of digital age learning culture and visionary leadership. However, there are no significant differences in opinions of digital leadership among school administrators and teachers in terms of digital citizenship and systemic changes. 5) The estimated Pearson r value of 0.07 revealed a "slight relationship" between digital leadership and teacher performance. 6) A training program was developed to help instructors improve their digital leadership and performance.

Additionally, Pagatpatan (2019) aimed to determine the digital leadership of school administrators in relation to teachers and principal performances which can be inputs for the techno – learning development model during the school year 2018 – 2019. The descriptive method of research was utilized with the teacher – made questionnaire which was validated by the field and experts. This also served as the data gathering instrument of this study. Three hundred four (304) teachers and one hundred ten (110) school administrators served as the respondents of the study. The hypotheses that were pursued are: 1) there is no significant difference between the perceptions

of the two groups of research participants on digital leadership, 2) there is no significant correlation between the school administrators' digital leadership and teachers' performance, and 3) there is no significant correlation between the school administrators' digital leadership and the principal performances. The analysis tools utilized to treat the data were frequency and percentage. In addition, weighted mean, t-test and Pearson r Correlation were also used.

The research studies of Dela Rosa and Pagatpatan are comparable to the present study because both the researchers' paper and the present study focuses on technology or digital leadership among school administrators. It only differs on the aspects of variables used where both the former and the present explores other related parameters in terms of educational technology leadership.

The scale has five dimensions: visionary leadership, digital age learning culture, perfectionism in professional practice, digital citizenship, and systematic progress. In the current study, the t-test and One Way ANOVA were used to examine the relationships between the directors' technological leadership abilities and their gender, age, length of service, and whether or not they were receiving in-service technology training. The research indicated that the most significant feature for directors is systematic development. There was also a relationship between age and professional perfectionism, as well as whether or not in-service technology training was taken and technical leadership, visionary leadership, and digital citizenship

In this perspective, the study also highlights tablet-specific benefits and problems. These findings have implications for the proper implementation of technology programs in impoverished nations at the classroom level. The study also brings to light tablet-specific benefits and issues in this context. These results have implications for the effective school-level implementation of technology programmes in developing countries. Policymakers and school administrators who want to deploy these devices in classrooms will find recommendations based on these findings.

In the study, data was gathered by looking through current articles with the phrase "technology integration". The study found that technological integration is a complicated and multidimensional process with multiple dynamics, and that full integration is impossible to attain. As a result, recommendations were provided in the context of various models and Google Workspace tools to assist in ensuring technological integration in accordance with the research' challenges.

Tomaro (2018) sought to emphasize the current condition of ICT integration in the Philippines' educational system, as well as the problems, initiatives, and potential solutions. The research is a review of two scholarly publications that look at ICT integration in the Philippine educational system. In the Philippines, ICT Curriculum Standards are being developed for K-12 schools. In the instance of the Philippines, the critical analysis of the reviewed articles indicated many governmental steps to completely integrate ICT in education, including increased teacher training, computer infrastructure provision, strategic integration of ICT in the curriculum, and strong leadership.
The study of Tomaro (2018) is related to the present study because both the present and the former highlighted the significant use of technology integration in teaching and classroom management.

Research Hypothesis

The following hypotheses are being pursued by the researcher:

1. There is no significant difference between the perceptions of the two groups of respondents on the technological leadership.
2. There is no significant difference between the perceptions of the two groups of respondents on technology integration.
3. There is no significant relationship between the technological leadership and technology integration.

Definition of Terms Used in the Study

The following terms are defined conceptually and operationally for purposes of clarity and better understanding of the study.

Adaptation Level. This refers to technology integration where teacher facilitates students in exploring and independently using technology tools. Operationally, this refers to integrating technology to help learners to

independently explore lesson using technology tools.

Adoption Level. This refers to technology integration where the teacher directs student in the conventional and procedural use of technology tools. Operationally, this refers to integrating technology in directing the lesson content to learners through measures and procedures.

Entry Level. This refers to the technology integration where teacher begins to use technology tools to deliver curriculum content to students. Operationally, this refers to integrating technology in delivering the lesson content to learners.

Infusion Level. This refers to the technology integration where teachers provide the learning context and the students choose the technology tools to achieve the outcome. Operationally, this refers to integrating technology in choosing and providing learning context and the technological tools in achieving the desired outcomes.

Technology Assessment. This refers to the early identification and assessment of eventual impacts of technological change and applications, as a service to policy making and decision making more generally. Operationally, this refers to the technological assessments of school heads.

Technology Forecasting. This refers to predict the future characteristics of useful technological machines, procedures or techniques. Operationally, this refers on how the school heads forecast on technological matters.

Technology Innovation. This refers to a new or improved product or process whose technological characteristics are significantly different from before. Operationally, this refers to the technological innovations of school heads in running the school.

Technology Integration. This refers to the use of technology tools in general content areas in education in order to allow students to apply computer and technology skills to learning and problem-solving. Operationally, this refers to the technology integration among the selected public junior high school teachers in Marikina.

Technology Leadership. This refers to ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources. Operationally, this refers to the technological leadership of school heads and teachers.

Technology Management. This refers to a set of management disciplines that allows organizations to manage their technological fundamentals to create customer advantage. Operationally, this refers to the school heads' technological management skills.

Technology Transfer. This refers to the process of transferring technology from the person or organization that owns or holds it to another person or organization. Operationally, this refers to the concept of school heads' technological transfer among their constituents.

Transformation Level. This refers to the integration where the teacher encourages the innovative use of technology tools. In this study, this refers to incorporating technology into the process of innovating and implementing technological innovations.

School Heads. This refers to a person whose job is to manage a school or other organization. Operationally, this refers to the school heads, head teachers, grade level chairperson and coordinators of the selected public junior high schools in the schools division office Marikina City.

Research Design

Methods of Research

The researcher employed the quantitative research which aimed to determine the technological leadership of school heads and technology integration among teachers. According to Creswel (2013) **quantitative research methods** emphasize objective measurements and the statistical, mathematical, or numerical analysis of data collected through polls, questionnaires, and surveys, or by manipulating pre-existing statistical data using computational techniques.

Quantitative research focuses on gathering numerical data and generalizing it across groups of people or to explain a particular phenomenon. The final written report has a set structure consisting of introduction, literature and theory, methods, results, and discussion.

Sources of Data

The focal sources of data were the seventy-two (72) school heads, one hundred eighty-two (182) teachers sourced from selected public junior high schools in the Division of Marikina, specifically in District I. The data were gathered from the respondents using the stratified random sampling of school heads and teachers in the selected schools division office Marikina specifically in district I.

Table 1 presents the distribution of respondents by school.

Table 1. Distribution of Respondents by School

School	Administrators			Teachers		
	Population	Sample	%	Population	Sample	%
1. Tañong High School	13	10	13.89	65	36	19.78
2. Malanday NHS	20	17	23.61	75	41	22.53
3. Sta. Elena HS	20	17	23.61	76	41	22.53
4. Sto. Niño NHS	18	15	20.83	68	37	20.33
5. Barangka NHS	16	13	18.06	50	27	14.84
Total	**87**	**72**	**100**	**334**	**182**	**100**

Data Gathering Instrument

The survey questionnaire was employed as the main instrument for gathering information on the respondents in this study. The researcher constructed the survey questionnaire. This was validated by five (5) regular and permanent graduate school professors of Marikina Polytechnic College and five (5) external personnel.

Part one of the survey questionnaire is the respondents' perception on the technological leadership of school heads in the aspects of technology innovation; technology assessment; technology forecasting; technology management; and technology transfer.

On the other hand, the part two is the respondents' level of technology integration in terms of entry level; adoption level; adaptation level; infusion level; and transformation level.

The researcher prepared two sets of survey instrument one for the school heads another for teachers where they assessed their technological leadership and technology integration.

Data Gathering Procedure

With the health issues, currently faced by teachers, the gathering of data was done using the online platforms and or face-to-face on the basis of ensuring and following safety measures set by the IATF. The letter to conduct the study was sent through online and or email. Other permissions were sought virtually.

Consequently, the Google forms and Google mail were used to transact and retrieved the data after the approval of the Schools Division Superintendent and the school principals in administering the said survey to the school heads and teachers of the selected public junior high schools in District I, Schools Division Office, Marikina City.

Administration of the survey instrument was undertaken by the researcher herself online since she is also an IT teacher of the school. With the help of other IT experts in online data gathering, the data were treated and tallied to its utmost confidentiality. Similarly, the researcher guided the research respondents in answering the survey questionnaire through computer-generated instructions to ensure accuracy and one hundred percent retrieval.

The researcher then collated, summed up, encoded, tabulated and tallied the answers from the respondents after the gathering of data. The interpretation and analysis of data followed.

Table 2. Range of Correlation Coefficient and Strength of Relationships

Range	Strength of Relationships
0.00	No relationship
±0.01 to ±0.20	Very low relationship
±0.21 to ±0.40	Slight or Weak relationship
±0.41 to ±0.70	Moderate relationship
±0.71 to ±0.90	High relationship
±0.91 to ±0.99	Very high relationship
±1.00	Perfect relationship

Correlated *t* test. This was utilized to see if there is a link between school leaders' technical leadership and teachers' technology integration.

Presentation, Analysis and Interpretation of Data

Level of Technological Leadership of School Heads as Perceived by the School Heads Themselves and the Teachers

Table 3. Respondents' Perceptions on the Level of Technological Leadership of School Heads Regarding Technology Innovation

Technology Innovation	Respondents			
	Teachers		Heads	
	WM	VI	WM	VI
1. ensures the utilization of Marikina e-learning program	3.94	HL	4.24	HL
2. encourages teachers to use online learning platforms	4.15	HL	4.33	HL
3. monitors the learners' and teachers' access to newly innovated e-learning platform	4.01	HL	4.13	HL
4. introduces new innovative hardware and software	3.77	HL	3.78	HL
5. adapts for the newly innovated software learning tools	3.86	HL	3.92	HL
Overall Weighted Mean	**3.95**	**HL**	**4.08**	**HL**
Standard Deviation	**0.67**		**0.64**	

Note: WM – Weighted Mean VI – Verbal Interpretation HE – High Level

It can be noted in the table that the level of technological leadership of school heads as perceived by the school heads themselves and the teachers in terms of technology innovation is **high** as shown by the overall weighted means of 3.95 and 4.08 respectively.

This entails that the technological innovation among the school heads are able to create innovation that change how the teachers and the learners live and deal with classroom learning situations.

Thus, both groups of respondents conformed that the technology innovation of the school heads motivated learners to collaborate on individual or group tasks utilizing technology-based tools for learning such as the Marikina eLearning platform and other productivity tools. Through techno-innovation, it enabled new ways of learning, interactive, and working cooperatively.

Table 4. Respondents' Perceptions on the Level of Technological Leadership of School Heads Regarding Technology Assessment

Technology Assessment	Respondents			
	Teachers		Heads	
	WM	VI	WM	VI
1. ensures that the hardware and software used are DepEd verified.	3.96	HE	3.93	HE
2. uses e-assessment data to effectively improve learning inferences among teachers and learners.	3.97	HE	4.01	HE
3. practices e-learning procedures and strategies towards e-teaching and learning.	3.96	HE	4.04	HE
4. creates a balanced technological assessment system.	3.87	HE	4.00	HE
5. creates rich techno-learning prospects for both learners and teachers.	3.87	HE	3.90	HE
Overall Weighted Mean	**3.93**	**HE**	**3.98**	**HE**
Standard Deviation	**0.71**		**0.71**	

Note: WM – Weighted Mean VI – Verbal Interpretation HE – High Extent

Technology Forecasting. The weighted mean and verbal interpretation of the respondents' perceptions on the level of technological leadership of school heads as perceived by the school heads themselves and the teachers in terms of technology forecasting is shown in Table 5.

Table 5. Respondents' Perceptions on the Level of Technological Leadership of School Heads Regarding Technology Forecasting

Technology Forecasting	Respondents			
	Teachers		Heads	
	WM	VI	WM	VI
1. provides input to estimate based on the demonstrated knowledge in an area related to the technology usage for school.	3.88	HL	3.97	HL
2. evaluates the performance of technological efficiency and effectiveness used in school.	3.92	HL	4.07	HL
3. anticipates opportunities and threats from technological changes used in teaching and learning process.	3.88	HL	3.99	HL
4. provides well-informed research and development decision making on the important utilization of technology.	3.84	HL	3.92	HL
5. decides on the right norms and suitable approaches for a given situation by predicting the right technological change in a certain coming school year.	3.93	HL	3.90	HL
Overall Weighted Mean	**3.89**	**HL**	**3.97**	**HL**
Standard Deviation	**0.70**		**0.70**	

Note: WM – Weighted Mean VI – Verbal Interpretation HL – High Level

It can be seen in the table that the level of technological leadership of school heads as perceived by themselves and the teachers in terms of technology forecasting is **high** as shown by the overall weighted means of 3.89 and 3.97 respectively.

This further implies that the school heads of selected public secondary schools in District I have predicted the future appearances of useful technological mechanisms, measures and technological techniques. Hence, technological usages, threats, developments and maintenance have been also considered.

Technology Management. The weighted means and verbal interpretation of the respondents' perceptions on the level of technological leadership of school heads perceived by themselves and the teachers in terms of technology management is shown in Table 6.

Table 6. Respondents' Perceptions on the Level of Technological Leadership of School Heads Regarding Technology Management

Technology Management	Respondents			
	Teachers		Heads	
	WM	VI	WM	VI
1. demonstrates effective management on the use of a computer system and computer software.	3.86	HL	3.86	HL
2. manages the use of technology throughout the school by observing how technology is used.	3.89	HL	4.00	HL
3. demonstrates knowledge of legal and ethical issues relating to the effective management of technology.	3.87	HL	3.93	HL
4. manages techno-based tool designed to support teachers and learners in measuring technology use in the school.	3.91	HL	3.89	HL
5. develops managerial strategies that integrate technology to meet the teachers' and learners' need in techno-educational set-up.	3.87	HL	3.85	HL
Overall Weighted Mean	**3.88**	**HL**	**3.91**	**HL**
Standard Deviation	**0.71**		**0.75**	

Note: WM – Weighted Mean VI – Verbal Interpretation HL – High Level

This means that the school heads of selected public schools of District I, of Marikina have managed their schools on the matter of technological essentials by creating and developing techno-strategies that would satisfy the learners' and teachers' technological needs in school.

Consequently, both the school heads themselves and the teachers believed that the technological leadership in the aspect of technological management had successfully initiated towards the attainment of technological objectives and goals of the schools.

Technology Transfer. The weighted mean and verbal interpretation of the respondents' perceptions on the level of technological leadership of school heads as perceived by the school heads themselves and the teachers in terms of technology management is shown in Table 7

This means that the school heads of selected public junior high school in District I have attempted themselves in transforming technological innovation, discoveries and techno-outcomes into new ways of doing school related undertaken to achieve success and goals. Moreover, it revealed that the school heads' capability in technological transfer had been successfully undertaken as confirmed by both the school heads and the teachers.

Table 7. Respondents' Perceptions on the Level of Technological Leadership of School Heads Regarding Technology Transfer

Technology Transfer	Respondents			
	Teachers		Heads	
	WM	VI	WM	VI
1. discovers intellectual property-related guidelines and creativities necessary to encourage the transfer and dissemination of technology to school community.	3.88	HL	3.88	HL
2. adopts for promoting technology transfer and dissemination of technological transfer to other schools division.	3.91	HL	3.88	HL
3. implements and analyze the technological standing of the school targeted to the activity in order to increase the likelihood of technological success.	3.92	HL	3.92	HL
4. advocates for preserving and firming school technology transfer policies and procedures.	3.94	HL	3.92	HL
5. promotes activities to advance school technology transfer by providing a webinar series on the utilization of hardware and software computer components.	3.96	HL	3.89	HL
Overall Weighted Mean	**3.92**	**HL**	**3.89**	**HL**
Standard Deviation	**0.72**		**0.72**	

Note: WM – Weighted Mean VI – Verbal Interpretation HE – High Level

The summary of the respondents' perceptions on the level of technological leadership of school heads as perceived by school heads themselves and the teachers is shown in Table 8.

It can be noted in the table that the level of technological leadership of school heads as perceived by the school heads themselves and the teachers is **high** as shown by the grand weighted means of 3.91 and 3.97 respectively.

Table 8. Summary of Respondents' Perceptions on the Level of Technological Leadership of School Heads

Technological Leadership	Respondents			
	Teachers		Heads	
	OWM	VI	OWM	VI
a. Technology Innovation	3.95	HL	4.08	HL
b. Technology Assessment	3.93	HL	3.98	HL
c. Technology Forecasting	3.89	HL	3.97	HL
d. Technology Management	3.88	HL	3.91	HL
e. Technology Transfer	3.92	HL	3.89	HL
Grand Weighted Mean	**3.91**	**HL**	**3.97**	**HL**

Note: OWM – Overall Weighted Mean

This shows that school leaders' technology leadership is beneficial to public junior high schools because they meet the quality requirement of becoming technology leaders. As a result, school leaders aided learning by enhancing school performance in terms of developing, implementing, and managing suitable technological advancements and resources.

As a result, the findings were supported by Schwab and Davis (2018), who stated that rapid technological advancements, particularly in the Industrial Revolution 4.0 (IR 4.0), are clearly altering every aspect of our lives, including leadership and educational settings around the world, and Hinton (2018) agreed, stating that emerging technologies in IR 4.0, such as Artificial Intelligence and the Internet of Things, are redefining the role of school leaders, instructional practices, and classroom transformation.

Test of Significant Difference Between the Perceptions of the Two Groups of Respondents on the Level of Technological Leadership

Tables 9 to 14 presents the computed *z* values and critical *t* values on the school heads' level of technology leadership as perceived by the school heads themselves and the teachers.

Table 9 presents the computed *z* value and critical *t* value on the school heads' level of technology leadership as perceived by the school heads themselves and the teachers as to technology innovation.

Table 9. Test of Significant Difference in the Perceptions of the Two Groups of Respondents on the Level of Technological Leadership as to Technology Innovation

Respondents	n	OWM	s	Computed z Value	Critical z value	Decision	Interpretation
Teachers	182	3.95	0.67	1.43	1.96	Fail to reject the H_0	Not Significant
School Heads	72	4.08	0.64				

Note: n – Sample Size s – Standard Deviation H_0 – Null Hypothesis
Level of Significance, α = 5%

As seen in Table 9, at 5% level of significance, the critical z value is 1.96, and the computed z value is 1.43. Since the computed z value is lower than the critical z value, the null hypothesis is not being rejected statistically. This indicates that there is no apparent difference in the perceptions of technical leadership in terms of technology innovation between the two categories of respondents.

This implies that both the school heads and the teachers have similar insights on the level of technological leadership of school heads relative to technology innovation. Thus, the way the school heads themselves see technology innovation does not significantly differ from the teachers' views on technological innovation leadership capabilities.

Table 10 shows the computed *z* value and critical *t* value on the school heads' level of technology leadership as perceived by the school heads themselves and the teachers as to technology assessment.

Table 10. Test of Significant Difference in the Perceptions of the Two Groups of Respondents on the Level of Technological Leadership as to Technology Assessment

Respondents	n	OWM	s	Computed z Value	Critical z value	Decision	Interpretation
Teachers	182	3.93	0.71	0.51	1.96	Fail to reject the H_0	Not Significant
School Heads	72	3.98	0.71				

Note: n – Sample Size s – Standard Deviation H_0 – Null Hypothesis
Level of Significance, α = 5%

The estimated z value of 0.51 is less than the critical z value of 1.96, as shown in Table 10. This signifies that the null hypothesis cannot be rejected at a 5% significance level. Consequently, there is no significant difference between the perceptions of the two groups of respondents on the level of technological leadership in terms of technology assessment.

This implies that the school heads themselves and the teachers have in common perception on the level of technological leadership of school heads. Their claims relative to the technology assessment of the school heads are the same. Furthermore, the technological leadership relative to the technology assessment of school heads has nothing to do with the way the teachers have observed in assessing technological matters in school.

Table 11 presents the computed *z* value and critical *t* value on the school heads' level of technology leadership as perceived by the school heads themselves and the teachers as to technology forecasting.

Table 11. Test of Significant Difference in the Perceptions of the Two Groups of Respondents on the Level of Technological Leadership as to Technology Forecasting

Respondents	n	OWM	s	Computed z Value	Critical z value	Decision	Interpretation
Teachers	182	3.89	0.70	0.81	1.96	Fail to reject the H_0	Not Significant
School Heads	72	3.97	0.70				

Note: n – Sample Size s – Standard Deviation H_0 – Null Hypothesis
Level of Significance, $\alpha = 5\%$

The computed z value of 0.81 is less than the critical z value of 1.96, as shown in Table 11. As a result, failing to reject the null hypothesis is the statistical decision. This suggests that there is no significant difference between the perceptions of the two groups of respondents on the degree of technical leadership in terms of technology forecasting at the 5% level of significance.

Table 12 presents the computed *z* value and critical *t* value on the school heads' level of technology leadership as perceived by the school heads themselves and the teachers as to technology management.

The calculated z value of 0.25 is less than the crucial z value of 1.96, as shown in Table 12. The statistical decision is not to reject the null hypothesis at the 5% significance level. This suggests that there is no substantial variation in perceptions of technical leadership in terms of technology management between the two groups of respondents.

This implies that the viewpoints of the two groups of respondents on the level of school heads' technology leadership as regards technology management were the same. Hence, both of them have similarly seen how technology management was demonstrated.

More so, the technology management of school heads does not significantly vary from what the teachers' observations on the school heads' technological management skills.

Table 12. Test of Significant Difference in the Perceptions of the Two Groups of Respondents on the Level of Technological Leadership as to Technology Management

Respondents	n	OWM	s	Computed z Value	Critical z value	Decision	Interpretation
Teachers	182	3.88	0.71	0.25	1.96	Fail to reject the H_0	Not Significant
School Heads	72	3.91	0.75				

Note: n – Sample Size s – Standard Deviation H_0 – Null Hypothesis
Level of Significance, $\alpha = 5\%$

Table 13 presents the computed *z* value and critical *t* value on the school heads' level of technology leadership as perceived by the school heads themselves and the teachers as to technology transfer.

The computed z value of 0.28 is lower than the critical z value of 1.96, according to Table 13. This means that the null hypothesis cannot be rejected at the 5% significance level. This means that there is no significant difference in perceptions of technological leadership in terms of technology transfer between the two groups of respondents.

This implies that the two groups of respondents have noticed technology leadership of school heads relative to technology transfer the same. Thus, they both agreed and claimed that the technology transfer of school heads have been established. Likewise, the school heads perceived technological transfer capabilities doesn't matter on what the teachers have observed them.

Table 13. Test of Difference in the Perception of the Two Groups of Respondents on the Level of Technological Leadership as to Technology Transfer

Respondents	n	OWM	s	Computed z Value	Critical z value	Decision	Interpretation
Teachers	182	3.92	0.72	0.28	1.96	Fail to reject the H_0	Not Significant
School Heads	72	3.89	0.72				

Note: n – Sample Size s – Standard Deviation H_0 – Null Hypothesis
Level of Significance, $\alpha = 5\%$

Table 14 presents the summary of test of difference in perception of the two groups of respondents on the level of technological leadership as perceived by the school heads themselves and the teachers.

As reflected in Table 14 the perceptions of teachers and school heads respondents on the level of technological leadership regarding technology innovation, technology assessment, technology forecasting, technology management, and technology transfer do not show significant difference, as evidenced by computed z values that are below the critical z value. As a result, the respondents' perceptions are the same.

Table 14. Summary of Test of Significant Difference in the Perceptions of the Two Groups of Respondents on the Level of Technological Leadership

Dimensions	Teachers		Heads		$Z_{computed}$ Value	Decision	Interpretation
	OWM	s	OWM	s			
a. Technology Innovation	3.95	0.67	4.08	0.64	1.43	Fail to Reject the H_0	Not Significant
b. Technology Assessment	3.93	0.71	3.98	0.71	0.51	Fail to Reject the H_0	Not Significant
c. Technology Forecasting	3.89	0.70	3.97	0.70	0.81	Fail to Reject the H_0	Not Significant
d. Technology Management	3.88	0.71	3.91	0.75	0.25	Fail to Reject the H_0	Not Significant
e. Technology Transfer	3.92	0.72	3.89	0.72	0.28	Fail to Reject the H_0	Not Significant

Note: $\alpha = 5\%$ Critical z Value = 1.96

This implies that both the school heads and the teachers have agreed on the way they appreciate the school heads' technology leadership where technology leaders can innovate, solve complicated challenges, and develop techno-school environment.

Hence, the way the school heads practiced their technological leadership do not significantly matter on what the teachers have observed.

Conclusion

Considering the findings above, the following conclusions are hereby arrived at:

1. The school heads and the teachers have the same perspective on how they appreciate the school heads' technological leadership in the aspects of technology innovation, technology assessment, technology forecasting, technology management and technology transfer.
2. The perception of both the school heads and the teachers on the technological leadership of school heads do not matter.

Recommendation

Based on the findings and conclusions drawn, the following recommendations are hereby proposed:

1. It is recommended that both the school heads and the teachers should attend the training program in technological leadership as well as teachers' technological integration.
2. The school heads should continue their practice in technological leadership.
3. The teachers should continue their expertise in integrating technology in their classroom.
4. Technological leadership is important in school where teachers' technology integration is practiced.
5. A proposed training program may be implemented to determine its efficiency.
6. Researchers are encouraged to study other variables related to technological leadership and technology integration.

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