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TECHNOLOGY LEADERSHIP OF SCHOOL HEADS AND TEACHERS' ATTITUDE TOWARDS ICT: THE MEDIATING EFFECT OF TECHNOLOGY LITERACY SKILLS

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Abstract:
The primary aim of the study is to find out the significance of the mediating effect of technology literacy skills on the relationship between technology leadership and attitudes towards ICT. Utilizing a correlational technique along with a quantitative non-experimental and mediation research design, data were obtained from 305 public elementary teachers working in Baganga North and South, Davao Oriental. The researcher used a total population sampling technique and the statistical tools mean, Pearson r, and path analysis. From the results of the study, it was found that there are very high levels of technology leadership, attitudes towards ICT, and technology literacy skills. Moreover, there are significant relationships between technology leadership and attitudes towards ICT, technology leadership and technology literacy skills, and technology literacy skills and attitudes towards ICT. Furthermore, technology literacy skills partially mediate the relationship between technology leadership and attitudes towards ICT.

SDG #4: Quality Education

Keywords: education, technology leadership, attitudes towards ICT, technology literacy skills, correlation, teachers, Philippines

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1. Introduction

There is a poor teacher attitude towards ICT, as many schools are not yet proactive in adopting ICT trends in instruction delivery. The majority of teachers are afraid of the computer, unaware of the resources available and unwilling to exert effort in planning for the set-up and operation of the necessary equipment (Ikwuka *et al.*, 2020). Also, Alvarez (2021) emphasized in his study that teaching using ICT becomes a problem in the Philippines because of a lack of training, a lack of ability to use technology, a lack of confidence to engage in technology approaches, and limited access to computer laboratories.

In terms of its importance, teacher attitudes toward ICT influence the implementation of technology in classroom teaching and are a major predictor of the use of new technologies in education. There is a significant role of visual materials in developing communication skills that help students to contextualize what they have learned (Ahmed *et al.*, 2020). In another study by Bariu and Chun (2022), there is a positive relationship between teachers' attitudes towards ICT and their competencies. ICT is an important component that can add value and improve performance among students.

In the study by Sellvaraju and Alias (2024), technology leadership is linked with teachers' attitude towards ICT, as school leaders drive further integration of ICT in schools. The technological initiatives by school leaders need to be strengthened in teaching and learning innovations to ensure the widespread integration of technology in schools. Similarly, a recent study by Alshidi and Rashid (2025) found out that technology leadership has a significant relation with teachers' attitude towards ICT. Effective leadership is essential in instilling confidence and competence in teachers when it comes to utilizing ICT.

Individuals who have digital citizenship are identified as having technology literacy skills. The principal's technology leadership can encourage teachers to use ICT. Principals should be role models to teachers and students in ensuring that the concept of pedagogy in the classroom is always carried out through an ICT approach (Ismail *et al.*, 2021). Relatedly, the recent study by Dasmo *et al.* (2025) determined that technology leadership has a significant relationship with ICT literacy skills. Leaders who practice technological leadership must develop ICT potential in the organization, and influence subordinates to use ICT effectively.

In the study by Yesilyurt and Vezne (2023), technology literacy skills have a positive association with attitude toward ICT. Attitudes of teachers and prospective teachers towards ICT are one of the most important factors for the success of ICT practice. In a similar vein, the research by Paciente (2022) identified that there is a significant relationship between technology literacy skills and teacher attitude towards ICT. When the level of literacy skill was high, the teacher's attitude was very favorable.

The main thrust of the study was to find out the significance of the mediating effect of technology literacy skills on the relationship between technology leadership and attitudes towards ICT of teachers in Baganga North and South Districts. Specifically, it

has the following objectives. First, to describe the level of technology leadership in terms of leadership and vision, learning and teaching, productivity and professional practice, support, management and operation, assessment and evaluation, and social, legal, and ethical issues. Second, to ascertain the level of attitudes towards ICT of teachers in terms of affective attitude, cognitive attitude, and behavioral attitude. Third, to describe the level of technology literacy skills of teachers. Fourth, to determine the significance of the relationship between technology leadership and attitudes towards ICT, technology leadership and technology literacy skills, and technology literacy skills and attitudes towards ICT. Fifth, to determine the significance of the mediation of technology literacy skills on the relationship between technology leadership and attitudes towards ICT.

There was an urgent need to conduct this study because as a researcher and who is presently teaching in Baganga, North District, Davao Oriental was motivated to find out the levels of technology literacy skills, technology leadership, and attitudes towards ICT specifically on how the teachers are able to manage and adapt with the challenges related to attitudes towards ICT which has highly impacted the teaching and learning activities for both the teachers and the students resulting to the changes on their technology literacy skills, technology leadership, and attitudes towards ICT.

2. Literature Review

Presented in this section is a brief discussion of related studies on the variables of the study, which will support the results of the study. Schmitz *et al.* (2023) define leadership and vision as principles setting directions by identifying a shared vision, creating a shared meaning, developing expectations, monitoring performance, and communicating the vision and goals. Principals with high leadership and vision engage others in establishing a vision, strategic planning, and ongoing evaluation cycle for transforming learning with technology (Gerald, 2020). In the study by Sailer *et al.* (2021), learning and teaching refer to technology use in classrooms as well as planning, implementing, evaluating, and sharing of technology-related teaching and learning activities. Also, Cantos and Callo (2022) define productivity and professional practice as the principal taking part in the professional development events aimed at improving their use of technology.

Moreover, Mendoza and Catiis (2022) refer to support, management and operation as providing teachers with extensive training, enough time, and continual support to ensure they have the knowledge, abilities, and confidence to teach with ICT. In the recent study by Ogegbo and Olujuwon (2025), principals with high support, management and operational support teachers' effective integration of technology into the instructional process. Principals who transform their school's teaching, learning and culture adopt technology leadership practices that are directive, supportive, participative, and achievement-oriented. In addition, Sobejana (2021) define assessment and evaluation as technology-enabled assessments that can help reduce the time, resources, and disruption to learning required for the administration of paper assessments.

Further, Schoentgen and Wilkinson (2021) refer to social, legal, and ethical issues as the social norms and ethical values across countries and cultures on the use of digital technologies.

In addition, in the study by Wijnen *et al.* (2021), affective attitude refers to positive and negative feelings that teachers might experience when using technology in their teaching. Attitude is formed by affective enjoyment and instrumental beliefs about the usefulness of technology. In a similar vein, Rauf and Swanto (2020) determined that a high affective attitude means that the teachers have a positive attitude towards the use of ICT in their everyday lives. Another study by Tran *et al.* (2023) defines cognitive attitude as the knowledge or belief about technology. In a previous study by Davidovitch and Yavich (2021), behavioral attitude refers to the behavior towards technology and the tendency to perceive such behavior as commensurate with one's desirable relationship with technology. Also, the research by Guillen-Gamez and Rodriguez-Fernandez (2022) identified that a high behavioral attitude towards technology will significantly influence the development of digital competence of teachers.

Additionally, Rohmanurmeta *et al.* (2024) in their study concluded that teachers need technology literacy skills to utilize technology in learning activities. There is a need to improve technology literacy skills through training in the use of digital technology and information presented through learning strategy courses. Relatedly, learning new technology literacy skills is important for most courses that are offered via online communities and networks. This enables teachers to apply technology literacy skills as the solution to classroom instructional problems and determine the importance technology literacy skills hold for the teachers (Digal *et al.*, 2024).

In a related study by Bokilis (2022), technology literacy skills are the skills expected for teachers to possess to be able to face the challenges of teaching in the 21st century. A balanced technology program combines a variety of skills such as word processing, presentation, spreadsheet, database, graphics, and publishing. Lastly, there is a need for enhanced technology literacy skills for learning purposes. Technical proficiency, creativity, digital citizenship, and innovativeness are important aspects of technology literacy skills (Generalao & Dabatos, 2024).

3. Material and Methods

The study was conducted in Baganga North and South Districts, Davao Oriental. From the 684 elementary teacher population in the 2 districts and using the Raosoft Sample Size Calculator available online, the sample size was computed considering a response distribution of 50%, a confidence level of 95%, and a margin of error of 5%. The sample size of the respondents was 325 public elementary teachers.

With a desire to give everyone a chance to be included in the study, a total enumeration sampling technique was used. The total enumeration sampling technique is a design where you choose to examine the entire population that has a particular set of

characteristics, such as specific experience, knowledge, skills, and exposure to an event (Laerd, 2012).

For the inclusion, exclusion and withdrawal criteria. In particular, the respondents are public elementary teachers who are currently employed for the Academic Year 2025-2026. The respondents who were included in the study are those full-fledged elementary teachers whose plantilla numbers are on file with the Department of Education, and they are the ones who were in a position to provide useful information to test the hypothesis of the study. Excluded from the study were those teachers in the junior and senior high departments, those who are working in private schools, those teaching in the elementary department but who are assigned to different districts and those teachers who also hold managerial or supervisory positions even in the areas under study. The withdrawal criterion specified that the target respondents were free to decline to participate in the survey. They were not forced to answer the research questionnaire and were encouraged to return it to the researcher for automatic disposal. Moreover, they can withdraw anytime from their participation in the research process if they feel uncomfortable about the study, since they were given the free will to participate without any form of consequence or penalty.

This study utilized a quantitative non-experimental design of research using a correlational technique. This kind of design, according to Creswell (2014) and De Vaus (2001), provides summary data specifically measures of central tendency, including the mean, standard deviation and correlation between variables or employing methods of analyzing correlations among multiple variables by using tests such as Pearson r and regression analysis. Generally, correlational studies use independent and dependent variables, but the effect of the independent variable is observed on the dependent variable without manipulating the independent variable (Patidar, 2013). This method of research was appropriate for this study because its objective is to determine the significant relationship of teacher attitude towards ICT, as the independent variable, technology literacy skills as the dependent variable and technology leadership, as the mediating variable.

The mediation process was used to determine whether the relationship between the technology leadership of schools is significantly reduced after inclusion of the mediating variable- technology leadership. In other words, mediating relationships occur when a third variable plays an important role in governing the relationship between the other two variables (MacKinnon, 2008).

This research study followed a systematic procedure. There was a letter-request for permission to conduct the study, approved by the Dean, Professional Schools, and once approved, it was sent to the Schools Division Superintendent of the Department of Education Division of Davao Oriental. The School Heads were furnished with said letter before the actual conduct of the data gathering. Also, before the actual data collection, the researcher secured a Certificate of Compliance from UMERC (UMERC Protocol Number 2024-383), which ensured compliance with some ethical considerations in research. The method used in the survey was a face-to-face method wherein the researcher made sure

that the classes of the teachers were not disturbed or cancelled during the conduct of the actual survey. All retrieved questionnaires were encoded in the Excel template after verification and checking for completeness of the answers. After all the tallying and validating of results, the data were analyzed and interpreted by the designated statistician, in line with the objectives of the study, after which the conclusions and recommendations were formulated.

As to the statistical tools used in this study: for the levels of technology leadership of school heads, teacher attitude towards ICT and technology literacy skills, the mean was used to answer research objectives 1, 2 and 3. For the test of significance with the hypotheses at 0.05 level of significance: Pearson Product-Moment Correlation (Pearson r) was used to determine the significance of the relationship between and among the variables: technology leadership of school heads, teacher attitude towards ICT and technology literacy skills of elementary school teachers. This answered research objective number 4. As to the objective on mediation, Path analysis was used to determine the significance of the mediation of technology literacy skills on the relationship between teacher attitude towards ICT and technology leadership of school heads.

The researcher ensured that ethical standards were strictly observed to protect the rights and well-being of the respondents. UMERC Certificate of Compliance was issued to the researcher in compliance with the ethical considerations. Moral concerns were observed during the conduct of this study. The researcher has sought the permission of the concerned officials regarding the conduct and involvement of the target respondents. The respondents were oriented on their roles and were informed that their participation is free and voluntary. They were asked through informed consent and were assured that the data collected from them would be kept private and confidential. The researcher ensured that no possible risks were involved, and mitigating measures, psychological, financial and physical preparations were also considered. There was no conflict of interest (COI) or traces of it, and deceit was avoided. For purposes of the publication, the adviser becomes a co-author of the study.

4. Results and Discussion

Table 1: Level of Technology Leadership

Indicators	SD	Mean	Descriptive Level
Leadership and Vision	0.35	4.58	Very High
Learning and Teaching	0.37	4.51	Very High
Productivity and Professional Practice	0.44	4.55	Very High
Support, Management and Operations	0.41	4.46	Very High
Assessment and Evaluation	0.41	4.55	Very High
Social, Legal and Ethical Issues	0.40	4.52	Very High
Overall	**0.29**	**4.53**	**Very High**

Presented in Table 1 is the level of technology leadership, which was measured by six indicators, namely: leadership and vision, learning and teaching, productivity and

professional practice, support, management and operations, assessment and evaluation, and social, legal and ethical issues. The level of technology leadership gained a total mean rating of 4.53, or very high and a standard deviation of 0.29. This means that the measures of technology leadership are always manifested. The indicator with the highest mean is of leadership and vision, with a mean score of 4.58, described as very high and a standard deviation of 0.35. Meanwhile, the indicator with the lowest mean is support, management and operations with a mean score of 4.46 or very high and a standard deviation of 0.41.

The very high level of leadership and vision implies that the principals set clear directions for the school. The result is aligned with authors (Gerald, 2020; Schmitz *et al.*, 2023) who mentioned that principals with high leadership and vision engage others in establishing a vision, strategic planning, and ongoing evaluation cycle for transforming learning with technology. Such principals identify a shared vision, create a shared meaning, develop expectations, monitor performance, and communicate the vision and goals.

In addition, the very high level of support, management and operations implies that the principals regularly provide teachers with extensive training, enough time, and continual support to ensure they have the knowledge, abilities, and confidence to teach with ICT. This is consistent with the authors (Mendoza & Catiis, 2022; Ogegbo & Olujuwon, 2025) who state that principals with high support, management and operational support teachers' effective integration of technology into the instructional process. Principals who transform their school's teaching, learning and culture adopt technology leadership practices that are directive, supportive, participative, and achievement-oriented.

Table 2: Level of Attitude towards ICT

Items	SD	Mean	Descriptive Level
Affective Attitude	0.48	4.51	Very High
Cognitive Attitude	0.40	4.59	Very High
Behavioral Attitude	0.47	4.63	Very High
Overall	**0.30**	**4.58**	**Very High**

Revealed in Table 2 is the level of attitudes towards ICT, with an overall mean of 4.58, described as very high, and a standard deviation of 0.30. This explains that the measures of attitudes towards ICT are always manifested. The results revealed that attitudes towards ICT are rated very high across all items. Moreover, the indicator behavioral attitude gained the highest mean score of 4.63 with a standard deviation of 0.47. It is followed by cognitive attitude with a mean score of 4.59 and a standard deviation of 0.40. Lastly, the indicator with the lowest mean is affective attitude with a mean score of 4.51 and a standard deviation of 0.48.

The very high level of behavioral attitude implies that the teachers have a highly positive behavior towards technology. The result is consistent with authors (Davidovitch & Yavich, 2021; Guillen-Gamez & Rodriguez-Fernandez, 2022), highlighting that a high behavioral attitude towards technology will significantly influence the development of

digital competence of teachers. Teachers have the tendency to perceive such behavior as commensurate with their desirable relationship with technology.

Moreover, the very high level of affective attitude implies that the teachers experience highly positive feelings when using technology in their teaching. The result is aligned with the authors (Rauf & Swanto, 2020; Wijnen *et al.*, 2021) who emphasized that a high affective attitude means that the teachers have a positive attitude towards the use of ICT in their everyday lives. Such an attitude is formed by their affective enjoyment and instrumental beliefs about the usefulness of technology.

Table 3: Level of Technology Literacy Skills

Items	**SD**	**Mean**	**Descriptive Level**
I can use social networking sites (e.g., Facebook).	0.57	4.62	Very High
I can use my e-mail account effectively (adding attachments and making e-mail lists).	0.48	4.64	Very High
I can block someone I don't want to contact in social networking environments.	0.69	4.42	Very High
I can prepare an assignment by using a word processing program.	0.59	4.57	Very High
I can use search engines effectively (e.g. Google, Yahoo)	0.54	4.64	Very High
I can access the information I want using different ICT resources.	0.50	4.62	Very High
I use up-to-date Internet resources while preparing my assignments.	0.57	4.53	Very High
I can access Internet resources from mobile devices.	0.51	4.62	Very High
I can compare the information I find on different web pages.	0.51	4.58	Very High
I can use technology effectively.	0.54	4.57	Very High
I can prepare a PowerPoint presentation.	0.54	4.61	Very High
I can draw a picture using graphic editing software.	0.73	4.47	Very High
I can use audio, graphics, and animation in my presentations.	0.66	4.50	Very High
I can make a video about my class and school.	0.53	4.59	Very High
I use technology while paying bills or making applications.	0.52	4.55	Very High
I participate in online discussion boards.	0.59	4.46	Very High
I express my opinions in Internet surveys.	0.57	4.42	Very High
Before buying a technological device, I search for user reviews on the Internet.	0.53	4.59	Very High
I share my knowledge of new technologies with my friends.	0.51	4.59	Very High
I follow developments in technological innovations.	0.52	4.56	Very High
I can adapt to technological innovations.	0.54	4.54	Very High
Overall	**0.42**	**4.56**	**Very High**

It can be viewed from Table 3 that the level of technology literacy skills has gained a total mean score of 4.56, or very high and a standard deviation of 0.42. This shows that the measures of technology literacy skills are always manifested. The very high level of technology literacy skills is due to the very high obtained and computed mean scores of its specific items. Specifically, the items "I can use my e-mail account effectively (adding attachments and making e-mail lists)" and "I can use search engines effectively (e.g. Google, Yahoo)" both gained the highest mean score of 4.64, labeled as very high with a

standard deviation of 0.48 and 0.54, respectively. On the other hand, the items with the lowest mean are "I can block someone I don't want to contact in social networking environments" and "I express my opinions on Internet surveys", both with a mean score of 4.42, labeled as very high with a standard deviation of 0.69 and 0.57, respectively.

The very high level of "I can use my e-mail account effectively (adding attachments and making e-mail lists)" and "I can use search engines effectively (e.g. Google, Yahoo)" implies that learning technology literacy skills is highly important for teachers. The result is aligned with the authors (Bokilis, 2022; Digal *et al.*, 2024) who stated that technology literacy skills are the skills expected for teachers to possess to be able to face the challenges of teaching in the 21st century. A balanced technology program combines a variety of skills such as word processing, presentation, spreadsheet, database, graphics, and publishing. This enables teachers to apply technology literacy skills as a solution to classroom instructional problems and determine the importance of technology literacy skills for teachers.

Furthermore, the very high level of "I can block someone I don't want to contact in social networking environments" and "I express my opinions on Internet surveys" implies that teachers need technology literacy skills to utilize them in learning activities. The result is coherent with the authors (Generalao & Dabatos, 2024; Rohmanurmeta *et al.*, 2024), wherein there is a need for enhanced technology literacy skills for learning purposes. Technical proficiency, creativity, digital citizenship, and innovativeness are important aspects of technology literacy skills. There is a need to improve technology literacy skills through training in the use of digital technology and information presented through learning strategy courses.

Table 4: Overall Significance on the Relationships between Technology Leadership, Attitudes towards ICT, and Technology Literacy Skills

	Technology Leadership	**Attitudes Towards ICT**	**Technology Literacy Skills**
Technology Leadership	1	.333**	.178**
Attitudes Towards ICT	.333**	1	.507**
Technology Literacy Skills	.178**	.507**	1

Presented in Table 4 are the results of the correlational analysis on technology leadership, attitudes towards ICT, and technology literacy skills. It can be seen from the table that when technology leadership is correlated with the measures of attitudes towards ICT, the overall r-value results in 0.333 with a p-value of 0.000, which is lower than the 0.05 level of significance. This implies that technology leadership has a significant relationship with attitudes towards ICT.

Additionally, when technology leadership is correlated with the measures of technology literacy skills, the overall r-value results in 0.178 with a p-value of 0.014,

which is lower than the 0.05 level of significance. This implies that technology leadership has a significant relation with technology literacy skills. Further, when technology literacy skills are correlated with the measures of attitudes towards ICT, the overall r-value results in 0.507 with a p-value of 0.000, which is lower than the 0.05 level of significance. This implies that technology literacy skills have a positive relationship with attitudes towards ICT.

The correlation between measures revealed that there are significant relationships between technology leadership and attitudes towards ICT, technology leadership and technology literacy skills, and technology literacy skills and attitudes towards ICT. The result of the study is consistent with the authors (Alshidi & Rashid, 2025; Dasmo *et al.*, 2025; Paciente, 2022), wherein technology leadership has a significant relation with teacher attitude towards ICT. Effective leadership is essential in instilling confidence and competence in teachers when it comes to utilizing ICT. Also, technology leadership has a significant relationship with ICT literacy skills. Leaders who practice technological leadership must develop ICT potential in the organization, and influence subordinates to use ICT effectively. Finally, there is a significant relationship between technology literacy skills and teachers' attitude towards ICT. When the level of literacy skill is high, the teacher's attitude is very favorable.

Table 5: Regression Analysis Showing the Influence of Technology Leadership on Attitudes towards ICT as Mediated by Technology Literacy skills

Step	Path	B	S.E.	β
1	c	.264	.064	.250***
2	a	.261	.105	.178**
3	b	.332	.044	.463***
4	c′	.018	.080	.164***

Mediation analysis includes four steps for the third variable to be considered as a mediator. Shown in Table 5 are the steps that were categorized as Steps 1 to 4. As revealed, Step 1 presents the significant direct effect of technology leadership on attitudes towards ICT. In Step 2, technology leadership shows a significant direct effect towards technology literacy skills, the mediator (M). Meanwhile, Step 3 presents the result of the analysis, which suggests that technology literacy skills predict attitudes towards ICT. Further mediation analysis using medgraph is necessary to determine the significance of the mediation effect because paths a, b, and c are found to be correlated. This analysis will involve the Sobel z test. Full mediation will be achieved if the effect of the independent variable on the dependent variable fails to be statistically significant at the conclusion of the analysis. It implies that the mediator variable is the mediating variable for all effects.

Additionally, when the regression coefficient is significantly reduced on the last step and stays significant, and only partial mediation is attained, which suggests that a portion of attitudes towards ICT is mediated by technology literacy skills, while other components are either directly influenced or indirectly affected by factors not involved

in the paradigm. Furthermore, as observed in step 4 (denoted as c'), the influence of technology leadership on attitudes towards ICT was seen to be reduced after being mediated by technology literacy skills. With this, partial mediation occurred as the effect was found to be significant at $p<0.05$.

Table 6: Results of Statistical Analysis on the Presence (or Absence) of Mediating Effect

Combination of Variables	Sobel z	p-value	Mediation
Technology Leadership → Technology Literacy Skills → Attitudes towards ICT	2.351350	$p<0.05$	Partial mediation

*p<0.05

Moreover, the result of the computation of mediating effects is shown in Figure 3. The Sobel test in Table 6 yielded a z-value of 2.35, $p<0.05$. This means that the mediating effect is partial, such that the original direct effect of technology leadership on attitudes towards ICT was reduced upon the addition of technology literacy skills. The positive value of Sobel z indicates that the addition of technology literacy skills reduces the effect of technology leadership on attitudes towards ICT.

Further, the computed effect size for the mediation test seen between the three variables is shown in the figure. The effect size determines the extent of the effect of technology leadership on attitudes towards ICT, which can be associated with the indirect path. The total effect value of 0.351 is attributed to the beta of technology leadership towards attitudes towards ICT. The direct effect value of 0.263 is the beta of technology leadership towards attitudes towards ICT, with technology literacy skills included in the regression. The indirect effect value of 0.087 is the value obtained from the original beta between technology leadership and attitudes towards ICT that now passes through technology literacy skills to attitudes towards ICT (a*b, where "a" denotes the path between TL ◎ TLS and "b" pertains to the path between TLS ◎ ATI). The indirect effect is divided by the overall effect to obtain the ratio index; in this case, 0.087 by 0.351 equals 0.247. It seems that about 24.7% of the total effect of technology leadership on attitudes towards ICT goes through technology literacy skills.

The aim of this study is to contribute to the literature regarding the possible mediating variable for the relationship between technology leadership and attitudes towards ICT. Specifically, technology literacy skills were investigated as the possible mediating variable that could explain the effect of technology leadership on attitudes towards ICT. Partial mediation is found in the study, and significant direct effects were presented that may help in the enrichment of the existing studies on technology leadership and attitudes towards ICT. This implies that the effect of technology leadership on attitudes towards ICT is improved through technology literacy skills.

This is aligned with authors (Ismail *et al.*, 2021; Sellvaraju & Alias, 2024; Yesilyurt & Vezne, 2023) who affirmed that principal's technology leadership can encourage teachers to use ICT. Principals should be role models to teachers and students, ensuring that the concept of pedagogy in the classroom is always carried out through an ICT

approach. Furthermore, technology leadership is linked with teachers' attitude towards ICT as school leaders drive further integration of ICT in schools. The technological initiatives by school leaders need to be strengthened in teaching and learning innovations to ensure the widespread integration of technology in schools. Lastly, technology literacy skills have a positive association with attitude toward ICT. Attitudes of teachers and prospective teachers towards ICT are one of the most important factors for the success of ICT practice.

5. Recommendations

The researcher came up with recommendations based on the results of the study. On the very high levels of the mean scores of the 3 variables (technology leadership, attitude towards ICT and technology skills, the researcher recommends sustaining the implementation of its best practices in the technology leadership, attitude towards ICT and technology literacy skills with the fellow teachers and most especially to the students, and remain open to different opinions while at the workplace.

On the very high level of technology leadership, the researcher recommends the need to develop a Division-wide plan on the continuous ICT upskilling of teachers in the integration of ICT in the teaching-learning process, conduct a training on ICT skills-enhancement for school heads, including their roles as technology leaders, and for school heads to develop and implement a vision and technology plan for the school.

The Department of Education may include this training in the School Head's Development Program as one of the foundational courses of leadership for the school heads and teachers. School heads may take their own initiative in attending seminars and trainings specifically in technological leadership at the regional, national and international levels to further hone their knowledge, skills and abilities in governing schools. The public-school heads should always aspire for an excellent level of their technological leadership competence for the effective and efficient achievement of organizational goals. Since leadership and school governance in the area of technological leadership obtained the lowest rating among the five dimensions of technology leadership, the public-school heads are encouraged to benchmark good practices of some schools in the region, which are identified as schools of excellence, to further improve their capabilities in leading and governing schools for continuous improvement. Further research may be conducted on the public-school heads' technological leadership competence on teachers' technology literacy.

On the very high level of teacher attitude towards technology, it is recommended that the Attitude of teachers towards the use of ICTs in the teaching and learning process should be enhanced through organizing workshops and seminars, which would help teachers to develop and sustain a positive attitude towards ICTs and their usage. The school management, through the initiatives of the teachers, may look for possibilities of requesting from the local government unit concerned and negotiate for some financial assistance in the installation of internet connections with a bandwidth strong enough to

cater to school activities during daytime classes. A specific budget may be requested and lobbied by the school for the approval of said request. Moreover, the teachers may encourage all the students to start or continue exploring the different social media platforms. This may allow both the teachers and the students to appreciate technology as a tool in the teaching and learning process.

Also, the school management may allow or continue to allow all the teachers to attend trainings and workshops on the appreciation of technology as one of the best tools in the delivery of their teaching lessons and activities and ultimately be able to render to the fullest their teaching abilities and capacities to all the students. Furthermore, the school management may provide the necessary ICT room and ICT paraphernalia for use by the teachers and students in the conduct of their classes. If the budget is not available, then an improvised room within the school may be utilized and the necessary equipment purchased for the purpose.

On the very high level of technology literacy skills, the researcher recommends continuing to continue learning online, which means participating in online courses, tutorials, and webinars to learn new digital skills and stay current with emerging technologies. There may be ongoing professional development with hands-on, subject-specific training, and a supportive environment that encourages experimentation and collaboration. Schools should also invest in the necessary technical infrastructure and support and integrate technology use into daily practice through both direct instruction and blended learning to ensure skills are consistently applied. The Department of Education may set standards and develop curricula to promote technological literacy, starting from the elementary level up to college levels.

On the significant mediation effect of technology leadership on teacher attitude towards ICT, the researcher recommends the conduct of a strategic training plan to improve leadership competencies and technology integration by school heads and teachers, which may be able to solve barriers and difficulties and lead to sustainable, successful digital school leadership and technology integration in education. The findings could provide the framework for incorporating the idea and nature of digital citizenship into leadership and management practices in educational institutions.

As to the future researchers, quantitative or qualitative studies in Information and Communication Technology (ICT) may be conducted to focus on concerns like the evolving ethical and social implications of AI and automation, closing the digital divide, ensuring data privacy and security, and addressing the environmental impact of ICT. Additionally, it is crucial to research how ICT can be better leveraged for sustainable development goals, particularly in developing regions, and to investigate the long-term impacts of technology on human well-being and learning, such as with young children and the elderly.

6. Conclusion

Based on the findings of the study, conclusions are presented in this section. There are very high levels of technology leadership, attitudes towards ICT, and technology literacy skills. Moreover, there are significant relationships between technology leadership and attitudes towards ICT, technology leadership and technology literacy skills, and technology literacy skills and attitudes towards ICT. Finally, technology literacy skills have a partial mediation on the relationship between technology leadership and attitudes towards ICT. The result of the study implies that the principals regularly exercise technology leadership. In addition, the teachers have positive attitudes towards ICT in school. The teachers are also highly skilled when it comes to technology literacy. Also, technology leadership has a significant relation with attitudes towards ICT. Similarly, technology leadership has a positive relationship with technology literacy skills. Relatedly, technology literacy skills are positively linked with attitudes towards ICT. Further, technology literacy skills partially mediate the relationship between technology leadership and attitudes towards ICT.

The results of the study clearly confirm the notion that technology literacy skills have a partial mediating effect on the relationship between technology leadership and attitudes towards ICT. The conclusions affirm the anchor theory, the Technology Acceptance Model (TAM) by Davis *et al.* (1989), which depicts how users accept and use technology. Lastly, the findings of the study are also supported by the Theory of Planned Behavior by Ajzen (1991) and the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh *et al.* (2003).

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Conflict of Interest Statement
The authors declare no conflicts of interest.

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