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Exploring the Principal's Technology Leadership: Its Influence on Teachers' Technological Proficiency

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Abstract*: The emergence of technology offers new avenues and opportunities in society, most in particular in school. To jive the current trends of 21st century education where technology infusion is highlighted as one of its salient features, principals should possess the skills of being technology know-how leader and advocator and also the teachers as facilitators and agents of technology in the school. Hence, this paper tries to look into a way to understand the influence of the principal's technology leadership in teachers' technological proficiency in public elementary schools in the district of Obando, Bulacan. Using a descriptive-correlational design, the researcher believes in finding a link between and among variables. The respondents of this study consist of one-hundred and five (105) public school teachers. The result indicates that the five indicators of technology leadership, teachers agreed on the technological leadership that their principal possessed. More so, teachers are proficient in the use of technology in the teaching and learning process. Using regression analysis, the study showed that the principal's technology leadership does not exert a significant influence on teachers' technological proficiency. It is recommended that other researchers may undertake similar studies to support or contradict the findings of this study.*

Keywords: Principal, Technology Leadership, Teachers, Technological Proficiency

1. INTRODUCTION

At present, the education system all over the world is now embracing and infusing the tenets and ideals of the Fourth Industrial Revolution where it mostly prompted the call of the advancement of the digital economy, robotics and scientific advancement, and automation technology. Nevertheless, certain human-related abilities do remain relevant making them essential values of the human capital sought by the upcoming industrial era (Thannimalai and Raman, 2018). The school, as the institution that provides learning and produces a productive leader of the country, is in the height of facing the challenge of how they will fully infuse and embrace the advancement of technology. Thus, the challenge requires all the principals and teachers to adopt with an open mind nature, changes, and advances brought by the rapid growth and development of technology. Principals and teachers should prepare on how they will adopt, infuse, and use technology in the school setting and equipping themselves with the latest trends of technology skills. Principals are required to act as technology leaders and teachers as facilitators, to provide the skills and knowledge for the 21st century education (Roblyer and Doering, 2014).

A principal's responsibility is to bring his teachers to adopt and infuse technology in the learning process as well as to improve their skills and proficiency in using technology in teaching in attaining the demand of the digital economy and workforce. Since technology is rampant and one of the fastest-growing in today's age, the need for principals to adapt and apply technological developments is indispensable. In this sense, principals are advised to develop their technological leadership in order to meet the new world order (Hacıfazlıoğlu, Karadeniz, & Dalgıç, 2011). For this reason, the new roles of principals could be listed as seeking new technologies, establishing computer labs, preparing teachers to integrate ICT effectively across the curriculum, and infuse there leadership capabilities in technology integration. Seemingly, technological leaders in the school, who are the principals, must be familiar with educational technology goals and standards. They must understand the benefits of how technology should be integrated into education and be able to develop staff development programs for teachers (Beytekin, 2014). A major component of technology leadership is how they will motivate their teachers to learn, use, and implement technology into their curriculum (Speedy and Brown, 2014). School leader's leadership predominantly concerns the use of technology aimed at teaching and learning in school, especially their role in managing ICT for instruction, learning, and other aspects related to ICT. Additionally, it has been found that ICT leadership is particularly vital for teachers to implement and foster innovations attached to ICT (Geir, 2013). A school leader is both a leader of change in enhancing school technology and an expert in technology leadership (Januszewski & Molenda, 2008).

Chin (2010) pointed out that technological leadership differs from traditional leadership theory in that it does not focus on the characteristics or actions of leaders but instead emphasizes that leaders should develop, guide, manage, and apply technology to different organizational operations so as to improve operational performance. Technological leadership is thus a type of functionally oriented leadership. Furthermore, the application of leadership skills necessary for school leaders to help their institutions apply technology in beneficial ways and prepare their schools for their 21st

century is the meaning of technology leadership. Building principals' technology leadership is essential in the school; principals must model effective technology leadership (Chang, Chin, & Hsu, 2008). In the same context, not only the principal should possess the capability and competence of technological infusion in the school but also the teachers. Teachers as the frontliners of the education sector should openly embrace the use of technology in teaching. Basitere & Ndeto-Ivala (2017) showed that the use of technology may bring deep and meaningful collaborative learning. The result quietly contributed an excellent performance and a well-versed proficiency in technology. Moreover, the study of Hero (2019) reveals that teachers show proficiency in how they infuse technology in teaching inside the classroom and considering it as pedagogical innovation in the education paradigm.

Unfortunately, Apsorn, Sisan & Tungkunanan (2019) explained that, in Thai education, the problems in educational technology, most of which are administrators' lack of readiness to use in information technology. Administrators still lack the readiness in learning technology and do not see the importance of innovation and information technology. Administrators lack knowledge, lack of experience, and expertise in using media to create innovative media and information technology nor various elements for teaching and learning. Further, most of the school administrators in Thailand still lack qualities in ICT leadership, which is a major problem affecting educational administration and management at the level of the school and overall education. More so, a study conducted by Unal, et al. (2015) revealed that there was no significant difference in the technology leadership self-efficacy levels in terms of the school level. Seemingly, not only the principals but also teachers had a problem when it comes to technology infusion. To wit, the study of Apau (2017) found out that teachers had a lack of technological content knowledge. For him to recommend that teachers and lecturers should continue to model the use of technology in teaching to update them on the technological pedagogical content further.

In the Philippine education context, school leaders, who are the principals and teachers, are now transforming themselves on what the Industrial Revolution 4.0 is pushing with to elevate the current education system in which their technological leadership is pointed-out on how it will further enhance the technological proficiency of their teachers. Hence, it is, therefore, the intention of the study to assess and describe the influence of the principal's technology leadership in teacher's technological proficiency, as well as, to determine the correlation of principal's technology leadership and teacher's technological proficiency. For the further enrichment of this study, the researcher seeks to raise management implications based on the findings.

Objectives of the Study

The main objectives of the study are to determine the principal's technology leadership and its influence on teachers' technological proficiency. Specifically, the study seeks to determine the following:

1. How may the principal's technology leadership be described in terms of the following indicators:
   1.1 visionary leadership;
   1.2 digital age learning culture;
   1.3 excellence in professional practice;
   1.4 systemic improvement; and
   1.5 digital citizenship?
2. How may the level of teachers' technological proficiency be described in terms of the following indicators:
   2.1 technology operations and concepts;
   2.2 planning and designing learning environments and experiences;
   2.3 assessment and evaluation;
   2.4 productivity and professional practice;
   2.5 social, ethical, legal, and human issues; and
   2.6 planning of teaching according to individual differences and special needs?
3. Does the principal's technology leadership exert a significant influence on teachers' technological proficiency?
4. What management implications may be drawn based on the findings of the study?

2. Methodology

Research Design

This study essentially made use of descriptive-correlation design where it attempted to determine the influence of the principal's technology leadership on teachers' technological proficiency. Correlational research is a systematic investigation that aimed to determine the existence of a relationship between two or more variables and to determine the nature and degree of relationship (Prieto, et al., 2017)

The study made use of a quantitative research approach in analyzing and interpreting the predictor and criterion variables. Standardized questionnaire on principal's technology leadership and educational technology scale standards for teachers in assessing teacher's technological proficiency was adopted as the primary data gathering tools.

Respondents of the Study

The respondents of the study were the public elementary school teachers, in the sum of 105, who have a permanent status in their respective schools, in the District of Obando, Bulacan. The respondents of the study were chosen through

universal sampling procedure. However, because of the work-from-home policy, only those teachers present in the school were able to answer the survey questionnaire.

Instrument of the Study

To gather data needed for this research, standardized questionnaire is adopted and used. First, the technology leadership survey scale had been used as a data gathering tool. The scale is a 21-item questionnaire that measures the principal's technology leadership. It was adapted for the Turkish culture by Hacıfazlıoğlu, Karadeniz, and Dalgıç (2011). In origin, the indicators of the questionnaire were adapted from the National Educational Technology Standards for Administrators (NETS-A) from ISTE (2009). Each item was rated on a five-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). Cronbach Alpha coefficient value was .97 for the whole scale. For the current study of Unal et al., (2015), the Cronbach Alpha coefficient value was calculated as .95 which showed the scale had a rather adequate internal consistency.

Meanwhile, for the teachers' technological proficiency, a standardized questionnaire was adopted to measure the technological proficiency of teachers. The standardized questionnaire, which is NETS-T, was used by Cocklar and Odabasi (2009) in their study and from NETS-T it was modified to the Educational Technology Scale Standard (ETSS). In this study, it was used to measure technology proficieny using a 5-point Likert scale: 1 (none proficient); 2 (least proficient); 3 (moderately proficient); 4 (proficient); and, 5 (highly proficient). The Educational Technology Scale Standard (ETSS) is reliable since it has a Cronbach alpha value of .957 (Cocklar and Odabasi, 2009).

Data Processing and Analysis

The data collected from the test was tabulated and processed using both descriptive and inferential statistics. In order to analyze and interpret the data, Statistical Packages for Social Sciences (SPSS) software version 23 was used. The principal's technology leadership, as the independent variable of the study, and teacher's technological proficiency, as the dependent variables of the study, were quantified using descriptive statistics such as weighted mean procedures. On the other hand, to determine the influence of the principal's technology leadership on teachers' technological proficiency regression analysis was utilized.

3. Results and Discussion

The teachers evaluated the technology leadership of their principal. Below is the summary of principal's technology leadership.

Table 1
Principal's Technology Leadership

	Principal's Technology Leadership	Average	Interpretation	Rank
1.	Visionary Leadership	4.13	Agree	1st
2.	Digital Age Learning Culture	4.07	Agree	2nd
3.	Excellence in Professional Practice	4.02	Agree	3rd
4.	Systemic Improvement	3.91	Agree	4th
5.	Digital Citizenship	3.85	Agree	5th
General Average		**3.99**	**Agree**	

Table 1 illuminates the technology leadership of principals in public elementary schools in the District of Obando, Bulacan. As can be observed from the summary of the principal's technology leadership average mean in Table 1, it appeared that visionary leadership recorded the highest weighted mean of 4.13, interpreted as agree among the five indicators of technology leadership. This implies that principals were good at inspiring and facilitating all stakeholders on the shared vision in relation to the maximization of digital resources in attaining the goal of the school. Also, the principal advocates policies and programs supporting the technological infusion and strategic plan for the school.

In general, the evaluation of teachers on the technology leadership of their principal as a whole was interpreted as agree as manifested by the general average of 3.99. This connotes that school principals are updated on the latest trends of school leadership with the infusion of technology. More so, principals, as evaluated by their teachers, are considered as 21st century leaders especially in modeling technology as one of their work ethics. As Roblyer and Doering (2014) pointed out, principals are required to act as technology leaders and teachers as facilitators, to provide the skills and knowledge for the 21st century education.

The teachers made a self-assessment of their technological proficiency based on the knowledge and skills acquired from and experienced from their profession. Below show the level of proficiency in the use of technology in teaching.

Table 2
Teachers' Technological Proficiency

Teachers' Technological Proficiency	Average	Interpretation	Rank
1. Technology Operations and Concepts	4.15	Proficient	2nd
2. Planning and Designing Learning Environment and Experiences	4.05	Proficient	4th
3. Assessment and Evaluation	3.91	Proficient	5th
4. Productivity and Professional Practice	4.21	Proficient	1st
5. Social, Ethical, Legal, and Human Issues	3.88	Proficient	6th
6. Planning of Teaching According to Individual Differences and Special Needs	4.09	Proficient	3rd
General Average	**3.99**	**Proficient**	

Table 2 reiterates the technological proficiency of public school teachers in the District of Obando, Bulacan. Results of the analysis of the from the summary of technological proficiency average mean in Table 2 revealed that productivity and professional practice recorded the highest weighted mean of 4.21, interpreted as proficient among the five indicators of technological proficiency. This implies that teachers were technologically proficient in evaluating themselves in terms of improvements in technology use and infusion, are able to explain the benefits of technology in their work, and in sharing ideas with colleagues and other employees in the school the role of technology in teaching and their development.

In general, the evaluations of teachers on their technological proficiency as a whole were interpreted as proficient as evidenced by the general weighted mean of 4.05. This implies that teachers are ready in technology infusion in teaching and proficient in navigating and using technology inside the classroom. In the study of Hero (2019), he pointed out that teachers in the 21st century were greatly equipped with regards to technological-pedagogical needed in technology-based and Internet-based instructions.

Table 3
Regression Analysis of the Influence of Principal's Technology Leadership to Teachers' Technological Proficiency

Principal's technology leadership in the school were quantified in terms of visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship. How the principal's technology leadership influences the technological proficiency of teachers has been the major concern of the study with the null hypothesis which states that the principal's technology leadership does not exert significant influence on teachers' technological proficiency. The data collected were subjected to regression analysis to determine the extent of influence the predictor variable cause on the criterion variable.

Variables	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	4.176	0.266	-	15.675	.000
Visionary Leadership	0.167	0.097	0.351	1.713	0.041
Digital Age Learning Culture	0.129	0.134	0.274	0.960	0.340
Excellence in Professional Practice	0.086	0.137	0.179	0.627	0.532
Systemic Improvement	0.13	0.131	0.239	0.993	0.324
Digital Citizenship	0.105	0.114	0.191	0.926	0.358
R-squared = 0.391					
F-value = 1.149					
p-value = 0.342					
alpha = 0.05					

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The result of the regression analysis in Table 3 revealed that all the indicators of technology leadership are correlated with the technological proficiency of teachers to a varying extent as shown by the non-zero B-coefficients. The nature of correlation is positive as can be gleaned from the B coefficients, which means that in general the better that the principal applies technology leadership in the school, the better technological proficiency. Conversely, the lower those principal applies technology leadership, the lower technological proficiency. The B-coefficients of the principal's technology leadership are producing a sound influence on the teachers' technological proficiency.

A closer look at the obtained coefficients, one could be gleaned that of the five indicators of technology leadership, one dimension which is visionary leadership recorded a B coefficient with associated probability less than the significance level set at .05. This means that visionary leadership with a B coefficient of .167 correlate significantly with the teachers' technological proficiency. The four other indicators of technology leadership such as digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship with B coefficients of .129, .086, .13, .105 respectively correlated with technological proficiency but no to a significant extent, since the associated probability exceeds the .05 alpha set.

Further analysis of the regression indicated that for every unit increase in visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship, the technological proficiency of teachers could generate an increase of .351, .274, .179, .239 .191, respectively. Analysis of the obtained Beta coefficients would indicate that of the five indicators of technology leadership, visionary leadership appeared to be the best predictor of technological proficiency (.351).

The result of the analysis of variance of the regression of principal's technology leadership indicators in technological proficiency of teachers revealed an F-value of 1.149 with the associated probability of .342, since the associated probability exceeds the .05 alpha set, this means that the five indicators of technology leadership have significant influence but to a significant extent. Hence, the null hypothesis, therefore, cannot be rejected. It may be safely concluded that the principal's technology leadership does not exert a significant influence on the teachers' technological proficiency.

This implies that the principal's technology leadership did not form a significant influence on teachers' technological leadership. More so, teachers can be more proficient when it comes to technology integration since this the current demand of a society where is in the peak of embracing Industrial Revolution 4.0.

Management Implications are drawn from the Findings of the Study

The following were the implications drawn based on the findings of the study:

1. The knowledge, capabilities, and understandings of school principals with regards to technology leadership is considering a point in accepting the challenge of 21st century education and the era of Industrial Revolution 4.0. Thus, its benefits were seen by the principal for them to continue in adopting this type of leadership to fully attain the goals and objectives of the Department and school, also.
2. The proficiency in integrating and infusing technology in teaching shows that teachers are well-equipped and knowledgeable on how they will address the needs of learners in the 21st century education, where technology is rampant in society. Through the program and that t school will provide, it will further enhance and strengthen the proficiency of teachers with regards to technology integration.
3. Because the principal is a technology leader, it easy for him to know and address the needs of his teachers when it comes to the incorporation of technology in the learning process. Thus, it easy for him to think about what kind of technology training is needed for his teachers to address their weaknesses in technology integration.
4. The influence of the principal's technology leadership does not see on the teachers' technological leadership. Thus, it is not the end of the line for the principal to support his teachers in technology integration in teaching. Principals should widely model his technology leadership to be the outlet of enhancement for his teachers and to continue the support of incorporation of technology in the education system.

4. Conclusions and Recommendation

Conclusions

In view of all the findings, the following conclusions were drawn:

1. The teachers were agreed on the technology leadership of their principal. It shows that their principal was ready to face the technology infusion

in managing the school, as well as, in facing the trends of Industrial Revolution 4.0.

2. A proficiency remarks on technology integration by the teachers shows that they are prepared and well-versed on how they will incorporate technology in day-to-day teaching, also, updated on trends and demands of 21st century education.
3. The null hypothesis that the principal's technology leadership does not exert a significant influence on teachers' technological proficiency is hereby sustained. Thus, the principal's technology leadership did not form a significant influence on teachers' technological leadership.
4. The findings drew several management implications that may help the principals and teachers to realize the need for trainings and prtrainingevelopment plans, and learning sessions to help them to be more aware of how they will manifest technological skills and capabilities in the school.

Recommendations

Based on the findings and conclusions of the study, the following recommendations are hereby offered:

1. That the principal should be more aware of how they will further improve their technology leadership. In order for the principals to do this, there should be stand-alone that focusing technology in management and leadership.
2. That the Division office should include the nature and concept of digital citizenship in school management and leadership. For them to do this, this indicator should be included in the School Head's Development Program, as one of the foundational course of leadership for the principal.
3. That the teachers should be more aware of the legal, ethical, social, and human perspective of technology integration, the schools should further give align to this matter o always include these topics on the summer training program or even in their learning action cell sessions.
4. That future researcher may undertake the same study to support nor to contradict the findings of the study and to have other findings on the influence of principal's technology leadership on teacher's technological leadership.
5. That future researchers, who may be interested on the same parameter of the study, may undertake similar study utilizing other variables which is not included in the study like literacy, competency, performance, attitudes and other related variables.

References

[1] Apau, Stephen Kwakye (2017). *Technological Pedagogical Content Knowledge Preparedness of Student Teachers of the Department of Arts and Social Sciences Education of the University of Cape Coast*. Journal of Education and Practice.Volume 8, No. 10, pp.167-181

[2] Apsorn, A., Sisan, B. & Tungkunanan, P. (2019). *Information and communication technology leadership of school leadership in Thailand*. International Journal of Instruction. 12(2), 639-650. https://doi.org/10.29333/ijii.12240a

[3] Basitere, Moses & Ndeto-Ivala, Eunice (2017). *An Evaluation of the Effectiveness of the Use of Multimedia and Wiley Plus Web-Based Homework System in Enhancing Learning in the Chemical Engineering Extended Curriculum Program Physics Course*. Electronic Journal of e-Learning. Volume 15, No. 2, pp. 156-173

[4] Beytekin, Osaman, F. (2014). *High school administrators' perception of their technology leadership preparedness*. Educational Research and Review. 9(14), 441-446

[5] Chang, I-H, Chin, J.M. & Hsu, C-M. (2008). *Teacher's perception of the dimensions and implementations of technology leadership of principals in Taiwanese elementary schools*. Educational Technology & Society, 11(4), 229-245

[6] Chin, J.M. (2010). *The theory and application of educational leadership*. Taipei, TW: Wunan

[7] Cocklar, A.N. & Odabasi, F. (2009). *Educational Technology Standards Scale (ETSS): A Study of Reliability and Validity for Turkish Pre-service Teachers*. Journal of Computing Education. International Society for Technology in Education (ISTE). Volume 25, Number 4

[8] Geir, O. (2013). *School leadership for ICT and Teachers' Use of Digital Tools*. Nordic Journal of Digital Literacy, 8, 107-125

[9] Hacıfazlıoğlu, Ö., Karadeniz, Ş., & Dalgıç, G. (2011). *School administrators' perceptions of technology leadership: an example for metaphor analysis*. Journal of Educational Sciences Research, 1(1), 97–121.

[10] Hero, J.L. (2019). *The impact of technology integration in teaching performance*. International Journal of Sciences: Basic and Applied Research (IJSBAR). 48(1), 101-114.

[11] International Society for Technology in Education (ISTE) (2009). *National educational technology standards for administrators* /online/. Retrieved on 3rd January 2013 from http://www.iste. org/docs/pdfs/nets-a-standards.pdf?sfvrsn=2

[12] Januszewski, A. & Molenda, M. (2008). *Definition. In A. Januszewski & M. Molenda (Eds), Educational Technology: A Definition with Commentary* (1st Ed.) New York, US, Lawrence Earlbaum Associates, 195-211

[13] Prieto, Nelia G., et.al. (2017). *Practical Research 2 for Senior High School: Quantitative. K to 12 Based*. Lorimar Publishing, Inc. Quezon City.

[14] Roblyer, M. & Doering (2014). *Integrating educational technology into teaching*. Harlow:Pearson

[15] Speedy & Brown (2014). *Technology Leadership in Education*. Retrieved 10/06/14. http://imet.csus.edu/imet1/mica/AR_Project_Final.pdf

[16] Thannimalai, R. & Raman, A. (2018). *The influence of principal's technology leadership and professional development on teachers, technology integration in secondary schools*. Malaysian Journal of Learning and Instruction, 15(1), 203-228

[17] Unal, E., Uzun, A.M. & Karatas, S. (2015). *An examination on school administrators' technology leadership self-efficacy*. Croatian Journal of Education. 17(1), 197-215