

# Socio-Demographic Characteristics, Technology Leadership Skills, Attitude and ICT Competence of School Administrators: Basis for a Training Design

Evernold C. Berial, PhD

Department of Education, Division of Malaybalay City, Philippines

**Abstract:-** The study developed ICT Competence Model as a basis for a training design. It employed descriptive-correlational and causal-comparative research design to determine correlations, best predictor variable, and the best fit structural equation model of the ICT competence of school administrators. It was conducted among the 805 elementary school administrators in the five select school divisions of Region X using an adopted research questionnaire.

The study revealed that the young adults school administrators are digital natives, while the rest of middle-aged and seniors are digital immigrants who either avoid or are reluctant in using ICT. They need ICT capability building activities. There is dominance of males over females in number. Most of the school administrators are neophytes with little or limited ICT training. Most of them have post graduate degree. Rural schools outnumbered the urban school with disparities in available ICT equipment and infrastructure.

The school heads are *skillful* in technology leadership in learning & teaching, productivity & professional practice, leadership & vision, social, legal & ethical issues, support management & operation, and assessment & evaluation. They have a *positive attitude* and manifested preferential use of ICT cognizance with its relevance and importance in increasing productivity. They also possessed *basic level* of ICT Competence and can perform most of the basic ICT operations and use it sometimes as tool for administration.

There is a significant relationship of the ICT competence of school administrators with the ICT training & years of administration and technology leadership skills and attitude in productivity & professional practice with different strength and direction. Attitude is the best predictor of ICT competence of school administrators followed by technology leadership skills. The ICT Competence Model of school administrators is anchored on the combined influence of technology leadership skills and attitude towards ICT. Its states that the higher the technology leadership skills an attitude they have, the more ICT competent they become. From the model, training on ICT productivity tools was conceptualized to enhance the ICT competence of school heads.

**Keywords:-** *Socio-Demographic Characteristics, Technology Leadership, Attitudes, ICT Competence.*

## I. INTRODUCTION

The competence of school administrators in Information and Communication Technology (ICT) is needed for them to integrate the use of ICT in school. The integration of ICT improves the school system in the aspects of administration, management, and delivery of educational services. The success of implementation depends on various interacting factors; available ICT hardware, software applications, and other ICT infrastructure, proficiency on its use and compliance to the international standards for the use of technology. For the school administrators in Region X, these are high expectations that call for ICT competence, technology leadership, and attitude to allow the ICT use to permeate all spheres of school processes, operations, and services. Sadly, there is no formal ICT training plan in place making them less competent, unprepared, indifferent, and unable to effectively perform administrative tasks requiring ICT skills.

School heads have to take technology leadership in the integration of ICT to the administrative functions. Afshari et al. (2012) contend that school principal should have the skills in the use of ICT in the administrative and managerial task. Studies found that the work of the principal is print-based, and these documents are kept in the form of records that provide relevant information about the school and from the external environment which aid decision making. This information pertains to instructional programs and activities, staff and students, personnel services, physical facilities, finance, supervision, and interaction with stakeholders outside the school. The deficiencies associated with storage, preservation, and presentation of large volumes of the information made the managerial processes very taxing among school administrators, which affects decision making.

The effective 21st-Century administrators are hands-on user of technology (Bosco, 2001). However, the contradictions between the ideal and the actual competence among the school principals are striking at odds since they could not perform their technology leadership role. This is due to the absence or the lack of ICT resources, low proficiency, lack of technology training, and indifference towards the use of ICT. The prominence of the preceding

reasons, situations, and gaps prompted the researcher to conduct a study to determine and generate a theoretical model that shows how the socio-demographic characteristics, technology leadership skill, attitude towards ICT influence the kind and level of school heads' ICT competence which is a basis of training design.

This training aims at providing the school administrators in the field with opportunities to develop and enhance ICT competence for better use in administrative functions and make them exemplars of ICT savvy school heads. It is meticulously planned with the consultancy of experts in the field of educational administration and Information Technology to objectively address the gaps and make a relevant contribution in paving the way to effective ICT integration in school administration.

**II. FRAMEWORK OF THE STUDY**

The theoretical underpinning of this study was anchored on Krumsick (2006) that ICT integration depends heavily on ICT competence. The higher the level of ICT competence, the greater the level of intention the school administrators have to champion the use of ICT in school (Bassellier et al., 2003). Maki (2008) also emphasized that

Information and Communication Technology (ICT) integration plays a vital role in supporting powerful and efficient management and administration, which requires ICT competence. The administration and management applications of ICT facilitate administration activities from data storage to knowledge management and decision making (Ghavifekr, 2013). The preceding theories show why the school administrators need to understand the capacities of the new technologies, to have the competence to use it and, to promote a school culture that explores the use of technologies in teaching, learning and, management (Schiller, 2003).

ICT competence helps school administrators to be effective technology leaders & Jacobsen, 2003). The quality of ICT competence of school administrators depends on the latent and overt relationship of endogenous and exogenous variables in the study. Figure 1 is the schematic diagram showing the hypothesized model of the study. The first independent variable of the study is the socio-demographic characteristics which include age, gender, length of administrative experience, school location as to rural or urban, number of hours of ICT training attended and highest educational attainment influence ICT competence (Aramide, 2015).

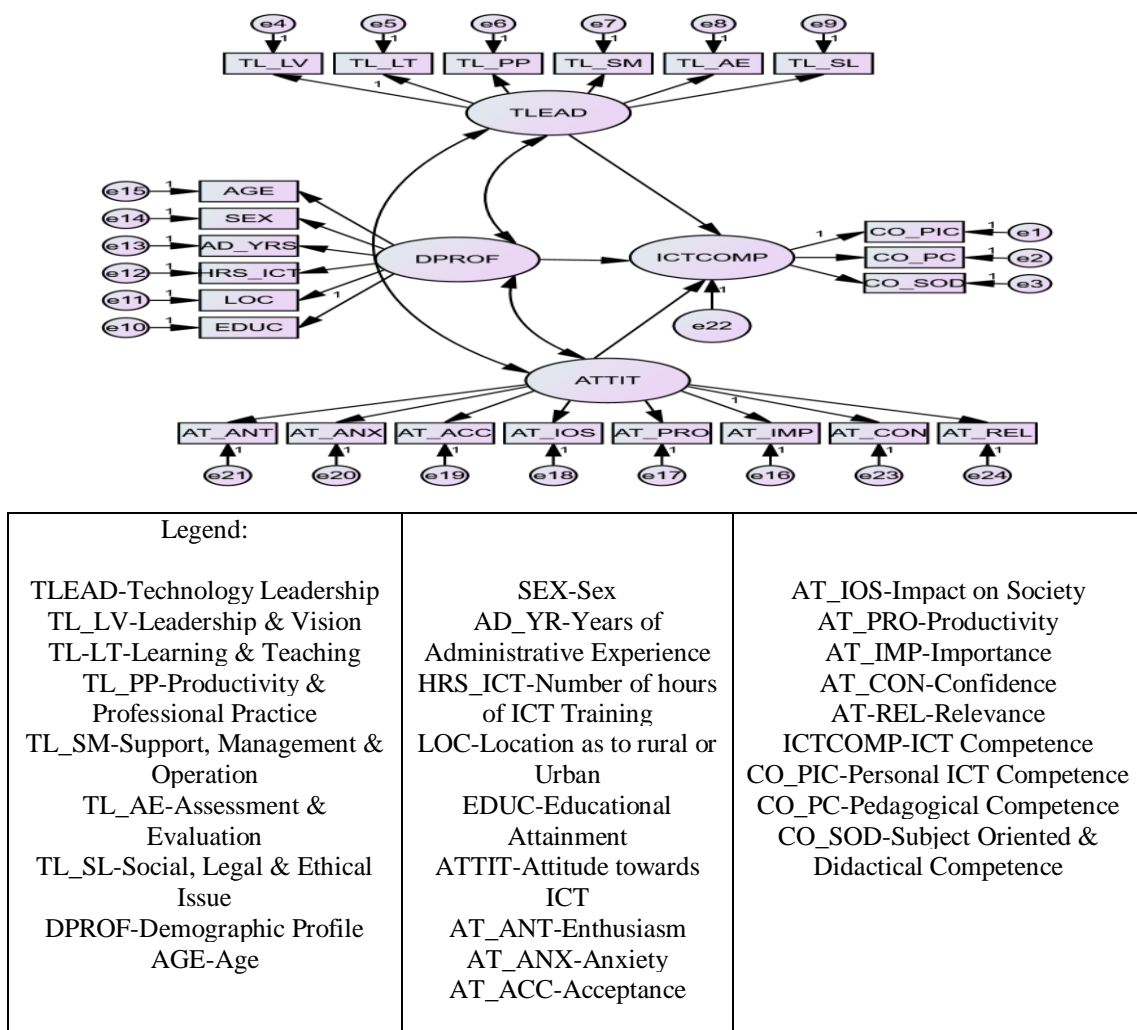


Figure 1. A hypothesized Structural Model 1 on ICT Competence of School Administrators

The next is technology leadership skills of school administrators which reflect the six important dimensions which anchor on the technology standards of school administrators: leadership and vision, learning and teaching, productivity and professional practice, support, management & operations, assessment and evaluation, and social, legal and ethical issues. This requires transformational leadership and innovations to introduce changes in the school which adheres to the Diffusion of Innovation Theory, which states that the gradual diffusion of technology in administrative processes improves the way the school operates.

Another latent exogenous variable is the attitude towards ICT of school administrators measured in terms of enthusiasm, anxiety, acceptance, impact on society, productivity, importance, confidence, and relevance. This study assessed the relationship of this variable to the ICT competence of school administrators as used in administrative functions based on Technology Acceptance Model (TAM), a theoretical model which states that the actual technology usage depends on behavioral intent. This model clarifies how the behavioral motive of the school administrators affect the extent of ICT utilization.

The endogenous variable of the study is the ICT competence of school administrators, which is inclusive of personal ICT competence, pedagogical competence, subject-oriented, and didactical competence which allow them to perform a task related to the use of office productivity tools of ICT, aid the teachers in the use of ICT to improve teaching delivery, and help teachers facilitate interactive learning and teaching through the use of ICT. Molina et al., (2016) asserted that a better adoption and integration of ICTs requires the development of competencies.

This study looked into the relationships of endogenous and exogenous variables, determine the best predictor of ICT competence, and test the hypothesized structural equation models to generate a causal model of ICT competence. The model is the basis in conceptualizing a training design on the office productivity tools to increase the level of school heads' ICT competence in region X. This is to make them proficient users of ICT, widen, and deepen the scope of ICT integration in teaching, learning, and school administration.

### III. STATEMENT OF THE PROBLEM

The study answered the following questions:

1. What is the socio-demographic profile of school administrators in the divisions of Region X in age, gender, length of administrative experience, school location, number of hours of ICT training attended and highest educational attainment?
2. What is the level of technology leadership skill among the school administrators in leadership and vision, learning and teaching, productivity and professional practice, support management and operation, assessment and evaluation, and social, legal & ethical issues?
3. What is the level of attitude towards ICT of the school administrators in enthusiasm, anxiety, acceptance,

impact on society, productivity, importance, confidence, and relevance?

4. What is the level of ICT Competence of School Administrators in terms of personal ICT competence, pedagogical competence, and subject-oriented & didactical competence?
5. What relationship exists between ICT competence of school administrators and socio-demographic characteristics, technology leadership and attitude towards ICT?
6. What variable, singly or in combination, best predicts the ICT competence of school administrators?
7. What structural model best fit the ICT competence of school administrators?
8. What training can be developed from the new model to enhance the ICT competence of school administrators?

### IV. METHODOLOGY

This study used descriptive-correlational and causal-comparative research design to determine the relationship of the socio-demographic characteristics, technology leadership skill, attitude towards ICT, and the level of ICT competence of the elementary school administrators. Descriptive correlational technique examined the relationship of responses on the latent variables with the different parameters or the measured variables under study. It assessed the strength and direction of relationships of variables using causal-comparative technique. It was conducted at the five select divisions of Region X; Division of Malayabaly City, Valencia City, Bukidnon, Cagayan De Oro City, and Gingoog City. It involved 805 school administrators, TIC, and OIC as participants who signed the consent form to participate in the study with the strict compliance the ethical standards in the conduct of research.

This study used a data-gathering tool adopted from the research instrument of Paglinawan (2015) with some modification of the performance tasks or indicators to fit the context of the study. Part I gathered the socio-demographic data. Part II measured the level of Technology Leadership skills. It was tried out to 30 school administrators at the division of Siargao and yielded a Cronbach alpha of 0.973. Part III measured the level of attitude towards ICT, and Part IV measured the level of ICT competence of the school administrators a Cronbach alpha of 0.971 and .855, respectively as reliability index. It also used descriptive statistical tools; frequency count and percentage to determine the socio-demographic profile; mean and standard deviation to determine the level of technology leadership skills, attitude and ICT competence. It correlated the endogenous and exogenous variables using Pearson-product moment correlation and used the Stepwise multiple regression analysis to determine the variable, which singly, or in combination, best predicts the ICT competence of school administrators. It also employed the use of Structural Equation Modeling (SEM) to determine the best fit model for the ICT competence of school administrators using maximum likelihood technique.

## V. PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

### *Socio-demographic characteristics of the school administrators*

The data show that majority of school heads are middle-aged, and the rest are young and adult classification. The young school administrators possessed the qualities of digital native while the middle-aged and old groups are digital immigrants. As observed, the younger administrators are more inclined in the use of ICT in school with greater ease in skills and familiarity than the older ones who usually delegate their work to their office assistant. There are more male school administrators in the region than female. As observed, more males among the neophyte school administrators are better since they are more inclined in exploration, especially, on the technicalities of computers. This corroborates with Shapka & Ferrari (2003) who found that males are more interested in ICT, frequent users of computers, have positive attitudes about computers than females and consequently outperformed them in ICT literacy.

The biggest percentage of the school administrators has less than five years of administrative experience. The findings disclose that the majority of the school administrators are still young in their respective positions. In spite of the difference in the length of administrative experience, it is not surprising that school administrators have not extensively used ICT in their administrative functions due to limited ICT resources in school. Facility wise, urban school is way far from what is available in rural areas. School administrators lack the expected ICT skills due to the very limited hours of ICT training. This suggests that they have to undergo training.

The study also revealed that most of the school administrators have masters' degree units, followed by masters' degree holders. Only a few of them are plain graduates of a baccalaureate degree. They lack with the expected ICT skills since there is no course or subjects offered that deal intensively on the application or use of ICT in school administration, teaching, and learning. This claim corroborates with Awalt and Jolly (1999) who noted that the gap of skills and knowledge is accounted to the lack of technology courses in administration and technology in-service courses the specifically prepare the school administrators for the job.

### *Level of technology leadership skills of school administrators*

Technology Leadership defines what and how a school administrator can inspire and influence the diffusion, integration, and use of ICT in school administration. The data on table 1 show that school administrators are generally skillful in technology leadership as shown in the total mean score and homogenous response as shown in the standard deviations which means that they have displayed the skill most of the time as it may be applicable. They possessed essential knowledge, hands-on skill, charismatic personality to inspire and model the use of ICT in the performance of

their administrative and instructional functions ushering the school to become ICT-driven.

Table 1  
Level of Technology Leadership Skills of School Administrators

	<b>Technology Leadership Skills</b>	<b>Mean</b>	<b>SD</b>	<b>Qualitative Description</b>
1	Learning and Teaching	3.16	0.57	Skillful
2	Productivity & Professional Practice	3.14	0.56	Skillful
3	Leadership and Vision	3.07	0.49	Skillful
4	Social, Legal & Ethical Issues	3.07	0.55	Skillful
5	Support, Management & Operation	3.04	0.52	Skillful
6	Assessment & Evaluation	2.99	0.58	Skillful
	Overall mean	3.07	0.56	Skillful

Among the indicators, technology leadership in learning and teaching obtained the highest rating. The use of ICT came out of the recognition that it facilitates the administration tasks, teaching, and learning, thus increasing productivity, which determines the quality of performance. School heads are capable of crafting and achieving technology plan aligned to the vision with the stakeholders. They are aware of the social, legal, and ethical issues that may arise out of misuse of technology that is detrimental to one's safety and security, thus dealing with it appropriately with great caution.

They are also cognizance of the fact that the kind of support they extend to the school makes ICT integration a success. They can validate the level of success of integration through the objective assessment and evaluation of the impact of ICT on the school system, teaching services, productivity, and the quality of learning. Finally, the overall picture of the level of technology leadership of school administrators suggests that much has still to be done to harness and enhanced the skill to reach the expert level in as much as the main focus of technology leadership is positioning the school to ensure its well-being under any reasonable scenario that might emerge (Tondeur, 2018).

### *Level of attitude towards ICT of the school administrators*

The data in Table 2 shows that school administrators have a favorable attitude towards ICT as the overall mean and homogenous response indicates. Their attitude suggests preferential use of ICT in their tasks with consideration of its relevance earning the highest mean followed by importance and enthusiasm. ICT is what is needed now in the so-called ICT-based school, which supports the idea of El Takach, Ayoubi & Kibbi (2018) that we are living in an increasingly demanding and dependent society on technology, and this requires an emerging school system based on ICT.



Table 2

Level of Attitude of School Administrators towards ICT

	Attitude of School Administrators Towards ICT	Mean	SD	Qualitative Description
1	Relevance	3.47	0.45	Highly favorable
2	Importance	3.38	0.44	Highly favorable
3	Enthusiasm	3.31	0.39	Highly favorable
4	Productivity	3.21	0.41	Favorable
5	Acceptance	3.14	0.51	Favorable
6	Confidence	3.04	0.47	Favorable
7	Anxiety	2.64	0.39	Favorable
8	Impact on Society	2.56	0.59	Favorable
	Overall mean	3.09	0.46	Favorable

School administrators have a favorable level of attitude towards ICT in terms of productivity, acceptance, confidence, anxiety, and impact on society with the lowest mean. The result means that school heads are in agreement with the fact that ICT has potential in increasing productivity in school in the areas of administration, teaching, and learning. They also manifested acceptance and confidence and negated that anxiety affects their behavioral intent to use this technology. Lastly, they consider the impact of ICT on the society last among the items knowing that while they are intensifying the use of ICT, gradually, they will feel it.

#### Level of ICT Competence of School Administrators

Personal competence helps determine how well the school head can use ICT in his work. Table 3 presents the level of ICT competence of school administrators. The data shows that school administrators have a basic level of ICT competence, which means that they can perform some of the basic ICT operations and uses ICT sometimes as a tool for administration. The result indicates that ICT competence of the school administrators is indispensable in the effective utilization and integration to the administrative function as well as in the educative process.

Among the indicators, they claimed that they have advanced skill in terms of Personal ICT competence, which means that they can perform most of the basic ICT operations and uses ICT frequently as a tool for administration. They still need to achieve the advance level of ICT competence to become computer savvy. This claim is consistent with the concept of Carter, Schaupp, and McBride (2011) that school administrators as facilitators in the integration and utilization of ICT need to be well equipped with ICT skills and knowledge.

Table 3

Level of ICT Competence of School Administrators

ICT Competence	Mean	SD	Qualitative Description
Personal ICT Competence	2.53	0.63	Advanced Level
Pedagogical Competence	2.28	0.58	Basic Level
Subject Oriented & Didactic Competence	2.31	0.58	Basic Level
Overall mean	2.38	0.53	Basic Level

Finally, the findings disclose that school administrators possess a basic level of pedagogical, subject-oriented, and didactic of ICT competence. This is far below the expectation of having an expert level of competence. The low level of ICT usage resulted from the low level of ICT literacy, or competencies, attitudes towards ICT, and the acceptance of ICT usage. To ensure effective integration of ICT in the school system, it is critical that the users possess the requisite competencies.

#### Correlation Analysis between ICT Competence of School Administrators and the Socio-demographic Characteristics, Technology Leadership Skill and the Attitude towards ICT

The data show that among the indicators under the socio-demographic characteristic, years of administrative experience and the number of hours in ICT training have shown significant relationship with respective r-value of -.173 significant at the threshold of 0.1 and .078 significant at .05, which differ in its strength and direction. The neophyte or young school administrators have higher ICT competence compared with the administrators with longer administrative experience. This negates the finding of Kirch and Lennon (2005) that there's no statistical relationship between the ICT skill of more experienced workers and less experienced workers. Variables like age, gender, location of the school, and educational attainment have shown no relationship to the ICT competence.

Technology leadership revealed the highest degree of correlation to ICT competence, as shown in its r-value of .36 and p-value of .000, which is significant at .01 confidence level. This means that technology leadership skills of school administrators are determining factors of ICT competence. They should be knowledgeable and competent as to the different areas in the school process and programs where ICT integration can get through. This supports Kearney and McGarr (2009) who asserted that school heads should be competent and knowledgeable about the technical, curricular, administrative, financial and social dimension of ICT use for effective and sustainable ICT integration and utilization.

The over-all correlation result indicated that attitude toward ICT with the obtained r-value of .221 and p-value of .000, which is significant at .01 level of confidence, showed a significant relationship to the ICT competence of school administrators. This means that attitude positively influences ICT competence. School heads have fully understood the role of ICT in school administration and

teaching and learning. This finding conforms with Kavagi (2010) that positive attitudes towards the use of computers is strongest when the role of computers in school management is made clear.

*Variable that best predicts the ICT competence of school administrators*

The researcher used Stepwise Multiple Regressions Analysis to examine and explain the extent of the relationship between the multiple predictor variables and the dependent or the criterion variable. Table 5 shows the result of the regression analysis estimating the impact of the predictor variables on the ICT competence of school administrators. Among the variables included in the regression analysis, only seven are significant predictors of the level of ICT competence of the school administrators as shown in the t-test result and the respective p-values which are less than .05.

Table 5  
Regression Analysis of the Predictor variables on ICT Competence of School Administrators

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
Constant	1.069	.189		5.661	.000
Demographic Profile					
Years of Administrative Experience	-.011	.003	-.128	-4.086	.000
Technology leadership					
Productivity and professional Practice	.137	.042	.145	3.254	.001
Assessment and Evaluation	.172	.039	.187	4.370	.000
Attitude towards ICT					
Productivity	.308	.053	.236	5.820	.000
Anxiety	-.272	.053	-.203	-5.144	.000
Enthusiasm	.154	.060	.113	2.559	.011
Relevance	.103	.048	.088	2.167	.031
R=0.48		R <sup>2</sup> =0.234		F-	
value=34.807		Probability=.000			

The study draws an explanation of the relationship based on the overall r-value of .48 which is the correlation coefficient that measures the strength of relationship between the seven independent variables (years of administrative experience, technology leadership in the area of productivity & professional practice, and assessment & evaluation, attitude towards ICT in terms of productivity, anxiety, enthusiasm and relevance) and the ICT competence. This means that one unit change in these seven measured

variables would imply an increase in the level of school heads' ICT competence, holding other variables constant. Moreover, the R<sup>2</sup> which is .234 indicates that 23.4% of the variance in the ICT competence of school administrators is explained by the combined variance of the seven aforementioned independent variables included in the model while the other 76.6% of the variance can be attributed to other factors or variable outside and apart from the regression model. Certainly, our model is significant based on the obtained F-value of 34.807 and p-value of .000, which is less than .001, which is the standard value.

The regression equation model:

$$Y=1.069-0.011X_1+0.137X_2+0.172X_3+0.308X_4-0.272X_5+0.154X_6+0.103X_7$$

Where: 1.069 is constant

Y=ICT competence

X<sub>1</sub>=years of administrative experience

X<sub>2</sub>=productivity and professional practice

X<sub>3</sub>=assessment and evaluation

X<sub>4</sub>=productivity

X<sub>5</sub>=anxiety

X<sub>6</sub>=enthusiasm

X<sub>7</sub>=relevance

Hence, the researcher rejected the null hypothesis stating that there is no variable, singly, or in combination, best predicts the level of ICT competence of the school administrators. ICT competence of school administrator is best predicted by the attitude towards ICT in terms of productivity as shown in the standardized coefficient beta weight of .236; highest beta weight is the best predictor. It is followed by Technology leadership in the areas of assessment and evaluation with the beta weight of .187, productivity and professional practice with the beta weight of .145, attitude towards ICT in terms of enthusiasm with the beta weight of .113, anxiety (-.203), years of administrative experience (-.128) and relevance (.088). The positive relationship, as shown on the beta weights signifies that the value of these variables dictates the level of the ICT competence and otherwise for the negative relationships.

Although information and communication technology (ICT) utilization enhances organizational effectiveness and efficiency, the human feature contributes to the success or failure of ICT's full implementation (Wahdain and Ahmad 2014). To ensure the successful implementation of information and communication in the organizations, it is critical that the users possess the requisite competencies to lead the use of technology and have the right attitudes towards ICT utilization, and accept the use of ICT as necessary for organizational effectiveness and efficiency.

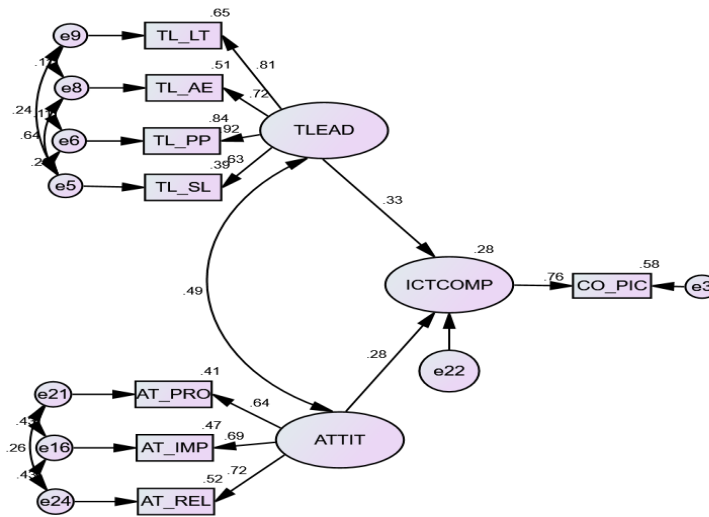
*Structural Model Testing*

A model is a statistical statement, expressed with an equation or diagram about the hypothesized relationships among variables based on the theory or research. Structural equation modeling tests which among the hypothesized model fits the data showing the hypothesized relationship of

the different predictors of the ICT competence of the school administrators. The researcher tested different models in an attempt to find the best fitting model.

As shown in the model, 28 % of the variance of the ICT competence of school administrators is accounted to the combined effects of the latent variable technology leadership (TLED) and attitude towards ICT (ATTIT). Table 6 shows the standardized estimates of the direct,

indirect, and total effects of Technology Leadership Skill & Attitude towards ICT on ICT Competence of School Administrators. The data show that technology leadership (TLED) has created the highest total effect of .330, followed by Attitude towards ICT with the beta of .278. This connotes that these two exogenous variables were highly significant with p-values, which means that variations in the ICT competence of school administrators are explained by these predictor variables.



Legend:

- TLEAD-Technology Leadership
- TL-LT-Learning & Teaching
- TL\_PP-Productivity & Professional Practice
- TL\_AE-Assessment & Evaluation
- TL\_SL-Social, Legal & Ethical Issue
- ATTIT- Attitude of School Administrators towards ICT
- AT\_PRO-Productivity
- AT\_IMP-Importance
- AT-REL-Relevance
- ICTCOMP-ICT Competence
- CO\_PIC-Personal ICT Competence

Figure 2. Structural Model on ICT Competence of School Administrators

Table 6

Direct, Indirect and Total effects of Technology Leadership Skill & Attitude towards ICT on ICT Competence of School Administrators

Latent Variable	Direct Effect	Indirect Effect	Total Effect
Technology Leadership	.330	0	.330
Attitude Towards ICT	.278	0	.278

Using structural equation modeling, five (5) hypothesized models were generated through subsequent analysis estimating the causal relations and the assumptions relative to the ICT competence of School Administrators. To determine the best fitting model, the obtained model fit value should be within the range of the standard fit indices; Chi-square minimum or degree of freedom (CMIN/DF) should be between 0 and 2 with p-value greater than .05, the RMSEA should be <.05 and the respective NFI, TLI, CFI, GFI should be greater than .95. Table 7 displays the

comparative analysis of the goodness of fit of the five structural models.

Structural Model 1-4 did not satisfy the standard fit index. Structural Equation Model 5 tested the relationship of attitude towards ICT and the technology leadership to the criterion variable, which is the ICT competence of the school administrators. It satisfied the standard fit indices required for a best fit model with the obtained CMIN/DF 1.358 which is below 2, P-value of .185 which greater than .05. Its obtained index value of NFI (.996), TLI (.997), CFI (.999), GFI (.995) which are all greater than .95 and the RMSEA of .021 indicated adequate model fit. This structural equation model perfectly fits with the data. Thus, the researcher rejected the null hypothesis stating that there is no model that best fits the ICT competence of the school administrator.

Table 7  
Summary of Goodness of Fit Indices of the Five Structural Models

Model	CMIN/DF	P-Value	NFI	TLI	CFI	GFI	RMSEA
1	7.783	.000	.837	.807	.786	.782	.092
2	9.793	.000	.725	.700	.744	.858	.105
3	5.912	.000	.901	.898	.916	.914	.078
4	12.816	.000	.808	.788	.819	.819	.121
5	1.358	.185	.996	.997	.999	.995	.021
Standard Value	< 2.00	>.05	>.95	>.95	>.95	>.95	<.05

Finally, the researcher rejected the null hypothesis stating that there is no structural model that best fits the ICT competence of school administrators. The study generated a Compact Disk Model on ICT Competence for school administrators. It was anchored on the Diffusion of Innovation Theory and Technology Acceptance Model.

*A Compact Disk Model on ICT Competence for School Administrators*

The Compact Disk Model on ICT Competence for school administrators theorizes that the higher the technology leadership and attitude the school administrators have, the more competent they become. It uses the symbolism of a compact disk. At the center is the ICT competence, which includes personal, pedagogical, and subject-oriented or didactic competence. The kind of competence a school head manifests depends on the internal quality of the variables affecting it. Technology Leadership skills and its four sub-variables pointing towards ICT competence is the first exogenous variable to produce influence on ICT competence. The effects of technology leadership which is measured in terms of productivity & professional practice, learning & teaching, assessment & evaluation, and social, legal, & ethical issues greatly influence ICT competence based on the beta weights they produce. Figure 3 shows the model.

It is supported by the *Diffusion of Innovation Theory* which states that the diffusion and success of integration of ICT in the school system requires leadership in technology from the school administrators. The school heads in the 21st-Century are expected to be ICT competent so that they can effectively demonstrate, model the use and lead the diffusion of ICT in the school system; administration, processes, operations, teaching, and learning. This corroborates with Grey-Bowen (2010) that the successful integration of technology in schools requires effective leadership through modeling technology use and acquiring personal proficiency in information and communication technology. It supports Slowinski (2003) that effective integration of educational technology in schools requires technology championing role and informed and effective technology leadership.

*A Compact Disk Model on ICT Competence for School Administrators*



Figure 3. Compact Disk Model on ICT Competence for School Administrators

Another variable the influence ICT competence is the attitude towards ICT which is measured in terms of relevance, importance and productivity based on its respective beta weights. It is supported by *Technology Acceptance Model* which states that the actual usage of technology depends on the behavioral intent of the user. Once the perceived usefulness and ease of use is internalized and accepted, the user is boundlessly able to act. It defines the school administrators' interlacing ICT competence, technology leadership, and attitudes. ICT competence is developed since it is an option of becoming current or relevant with the expectations among 21<sup>st</sup> century school heads who are expected to be hands-on users, which is important in increasing productivity in school. Finally, the model shows that level of ICT competence of school administrators depends largely on the technology leadership skills and attitude. When the school administrators have high ICT competence, they show greater intense drive to champion or lead the integration of ICT. This corroborates with the concept of Bassellier et al., (2003) that the higher the level of ICT competence, the higher the intention the school administrators have to champion the use ICT in school.



### *Training Design to Develop the ICT competence of School Administrators*

From the newly generated model, the researcher conceptualized a training design to cover the variables that objectively define ICT competence. Starr (2001) asserted that competence in using computers require positive attitude, practice time and staff development. The school administrators should receive meaningful and sustained training in technology integration, pedagogy and leadership practices. The researcher conducted consultation with the ICT experts to ensure the inclusion of practical and useful ICT skills for them to fulfill their technology leadership functions. Its content is also aligned on what is contained in the technology standards for school administrators.

The training design captured the different components contained in the Compact Disk Model of ICT Competence for School Administrators. The topics on ICT Productivity tools enhance personal competence of school administrators for better and improved school performance and productivity. The potential areas of administration, teaching and learning for ICT integration develop well-informed technology leaders who are capable of wider and deeper technology application. Cybercrime laws and digital citizenships promote better attitude, acceptance, legal, and ethical use of technology. Training on SPSS, Minitab, and Geographical Information System (GIS) software may aid in analyzing school data, preparing presentations, mapping of concepts, and communicating with others whenever needed.

## VI. FINDINGS

Based on the gathered data, the findings of the study revealed the following:

1. The socio-demographic characteristics revealed that for age, most of the school administrators are young adult and middle-aged with only few on the seniors' bracket. There are more male than female. Majority of them have more or less three days of ICT training. Their average number of years in school administration is only around four years. Most of them are handling schools in the rural areas than in urban places. Most of them have earned Masters' units and degree and very few have doctorate units and degree and are bachelors' degree holders.
2. School administrators are generally skillful in technology leadership in terms of learning and teaching, productivity and professional practice, leadership and vision, social, legal & ethical issues, support management and operation, and assessment and evaluation.
3. The school administrators generally have a favorable attitude towards ICT. They manifested a highly favorable attitude towards relevance, importance & enthusiasm, and a favorable attitude towards productivity, acceptance, confidence, anxiety & impact to the society.
4. School administrators generally have a basic level of ICT competence. They claimed to have an advanced level in terms of personal ICT competence and basic level in terms of pedagogical and subject-oriented & didactic ICT competence, which is far below the expectation of having an expert level of competence.

5. There is a significant correlation between the ICT competence of school administrators with the socio-demographic profile, technology leadership skills, and attitude towards ICT. There is a positive correlation between with the ICT competence and the number of hours in ICT training, productivity and professional practice, assessment and evaluation, learning and teaching, social, legal & ethical issue, support management and operation, and leadership and vision. There is a negative correlation between ICT competence and the number of years of administration and anxiety.
6. Attitude towards ICT in terms of productivity, technology leadership in terms of assessment and evaluation, productivity and professional practice, enthusiasm and anxiety, years of administrative experience, and relevance best predicts the ICT competence of school administrator. The positive relationship signifies that these variables influence the level of ICT competence.
7. Structural Equation Model 5 is the best fit model since it satisfied the standard criteria for model fitting. The result advances the newly generated ICT Competence Model theorizing that the ICT competence of school administrators is a product of the combined influence of technology leadership skills measured in terms of learning and teaching, assessment and evaluation, productivity and professional practice, social legal and ethical issues and attitude towards ICT in terms of productivity, importance, and relevance. The model explains that the higher the level of technology leadership skill and attitude the school administrators have, the more ICT competent they become.

## VII. CONCLUSIONS

Based on the findings of the study, the researcher concludes that:

1. In terms of age, there are young adult, a middle-aged group with only a few senior administrators. Young adults are the digital natives who are more inclined in the use of technology while the rest are digital immigrants who avoid and reluctant in using ICT. They need ICT capability building activities. There is a dominance of males over female in terms of number. Most of the school administrators are neophytes and still learning to use and integrate ICT, have a little or a limited number of hours in ICT training. Most of them have a postgraduate degree. Rural schools handled by school heads outnumbered the urban schools with disparities in available ICT equipment and infrastructure.
2. The school administrators displayed most of the time as it may be applicable their technology leadership skill in terms of learning and teaching, productivity and professional practice, leadership and vision, social, legal & ethical issues, support management and operation, and assessment and evaluation.
3. School administrators have a favorable attitude and manifested preferential use of ICT in their tasks cognizance of its relevance, importance, level of enthusiasm of its use, effects on productivity, acceptance, confidence, anxiety, and impact on society.

4. School administrators possessed a basic level of ICT competence in terms of pedagogical, subject-oriented and didactic competence, which is far below from the expected expert level skill; therefore, they can perform most of the basic ICT operations and use ICT sometimes as a tool for administration.
5. There is a significant relationship between the ICT competence of school administrators with the socio-demographic profile, technology leadership skills, and attitude towards ICT with different strengths and directions. The researcher rejected the null hypothesis stating that there is no significant relationship between the ICT competence of the school administrators and the socio-demographic characteristics, technology leadership skills, and the attitudes towards ICT.
6. Attitude towards ICT in terms of productivity, technology leadership in terms of assessment and evaluation, productivity and professional practice, enthusiasm, years of administrative experience; under socio-demographic profile and relevance best predict the ICT competence of school administrators. The researcher rejected the null hypothesis stating that there is no variable singly, or in combination, best predicts ICT competence.
7. The best fit structural equation model for ICT competence is a product of the combined influence of technology leadership and attitude towards ICT. The model explains that the higher the level of technology leadership skills and attitude the school administrators have, the more ICT competent they become.
8. Training Design based on the ICT Model of Competence for School Administrators includes ICT Productivity Tools, which develops and enhances Technology Leadership Skills and Attitude for preferential use of ICT.

### RECOMMENDATIONS

Based on the findings and conclusions of the study, the researcher recommends that:

1. School heads may attend relevant trainings to enhance their ICT competence to be effective in their administrative and instructional functions.
2. DepEd may conduct intensive ICT training for school administrators to become highly competent and provide standard ICT equipment and infrastructures to promote intensive integration of ICT in school administration, teaching, and learning. They could craft ICT-based curriculum framework, teaching guides, and lessons containing ICT competencies for the learners.
3. Higher Education Institution may offer a course, or subject that will intensively train and equip the graduates with the expected ICT-based administrative skills needed in the field.

### REFERENCES

- [1]. Afshari, M., et al. (2012). Factors affecting the transformational leadership role of principals in implementing ICT in schools. *The Turkish Online Journal of Educational Technology*, 11(4), 164-176.
- [2]. Aramide, L.A. (2015). Demographic variables and ICT access as predictors of information communication technologies' usage among Science teachers in federal unity schools in Nigeria. *e-journal*. Retrieved from <http://digitalcommons.unl.edu/libphilprac/1217>
- [3]. Awalt, C. & Jolly, D. (1999). An inch deep and a mile wide: Electronic tools for savvy administrators. *Educational Technology and Society*. (2), 142-152.
- [4]. Bosco, J. (2001). Technology standards for school administrators (TSSA). <http://www.ncrttec.org/pd/tssa/>
- [5]. Carter, L., Schaupp, L.C., & McBride, M. E. (2011). The U.S. E-file initiative: An investigation of the antecedents to adoption from the individual taxpayers' perspective: *e-Service Journal. A Journal of Electronic Services in the Public and Private Sectors* 7 (3), 2–19.
- [6]. El Takach, Ayoubi, & Kibbi (2018). Schools principals' attitudes, level of ICT Use and leadership style. The proceedings of Educational & Social Sciences (EPESS), Eurasia. (9) 303-315
- [7]. Flanagan, L., & Jacobsen, M. (2003). Technology leadership for the 21<sup>st</sup> century principal. *Educational Administration Journal* 41 (2), 124-142
- [8]. Ghavifekr, S. et al. (2013). ICT application for administration and management: a conceptual review. Retrieved from [www.sciencedirect.com](http://www.sciencedirect.com)
- [9]. Grey-Bowen (2010). A study of technology leadership among elementary public school principal in Miami-Dade County. Unpublished dissertation. St. Thomas University, Miami Garden Florida. Retrieved from <http://searchproquest.com>
- [10]. Kavagi (2001). The use of computers in secondary school: A survey of schools in western Province. Unpublished masters' thesis. Moi univeristy
- [11]. Kearney, G., & McGarr, O. (2009). The role of the teaching principal in promoting ICT use in small primary schools in Ireland. *Technology, pedagogy and education*, 18(1), 87-102.
- [12]. Kirsch, I., & Lennon, M. 2005. The ICT literacy framework. *Measuring adult literacy and life skills: New frameworks for assessment*. Ottawa: Statistics Canada 13, 189-252
- [13]. Maki, C. (2008) Information and communication technology for administration and management for secondary school in Cyprus. *Journal of online learning and teaching*, 4, 3p.132-146
- [14]. Molina et al., (2016). ICT standards and competencies from the pedagogical dimension: A perspective from levels of ICT adoption in teachers' education practice. P.1-76
- [15]. Schiller, J. (2003). Working with ICT: Perceptions of Australian Principals. *Journal of Educational Administration*, 41 (2), 171-185

- [16]. Shapka, J. D., & Ferrari, M. (2003). Computer-related attitudes and actions of teacher candidates. *Computers in Human Behavior*, 19(3): 319 -334.
- [17]. Slowinski, J. (2000). Becoming a technologically savvy administrator. *ERIC Clearing house on Educational Management*. Retrieved from <http://eric.uoregon.edu/publication/digests/digest135.html>
- [18]. Starr, L. (2001). The administrator's role in technology integration. *Education World*. Retrieved from [http://www.educationworld.com/a\\_tech/techo88A.shtml](http://www.educationworld.com/a_tech/techo88A.shtml)
- [19]. Tondeur, J. (2018). Enhancing future teachers' competencies for technology integration in education: Turning theory into practice. *International journal of media, technology and lifelong learning* 14(2), p. 216-224
- [20]. Wahdain, E. A., & Ahmad, M.N. (2014). User acceptance of information technology: factors, theories and applications. *Journal of Information Systems Research and Innovation* (6), 17-25.