

# Latest- Relationship between Principals' Technology Leadership and Teacher's Technology Use in Secondary Schools

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**Abstract:** - *The purpose of this study was to identify the relationship between leadership behaviour and computer use and management and teaching operations in schools. Researchers want to look at technology leadership for measuring the NETS-An international standard system (ISTE, 2014) and the impact of technology achievement in these schools.*

**Methodology-** *A systematic random sampling was conducted to select 74 principals and 374 teachers from 74 schools from the National Secondary School in Kedah in this cross-sectional survey. The Principal Technology Leadership Assessment (PTLA) is based on the National Education Technology Standards-Administrator, NETS-A (2009). The technology leadership questionnaire contains 65 Likert-scale items used to obtain information about the involvement of principals in their work.*

**Findings-** *The results of the study show that the overall leadership skills of the principals based on the five standards in the NETS-A are high based on the findings of mean analysis and standard deviation but showed moderate achievement in each field of TTU teacher study. The SMART-PLS analysis also indicated that the gender, age, and experience of the principal were not moderators because the results were not significant. Simple Linear regression was used to identify the principal technological leadership relationship with teacher computer use and the results were not significant.*

**Significance-** *Principals as technology leaders need to facilitate and enhance ICT integration as ICT contributions have been shown to be key factors for increasing productivity, promoting economic growth, and reducing poverty in a country.*

**Keywords:** - *Technology, Technology leadership, NETS-A Standards*

## 1. Introduction

Today, the use of computers has spread worldwide and in schools and educational institutions it has become a necessity for educators, students and management alike to use it. The rapid development of information and communication technology (ICT) is crucial to economic development as it enables people to access information and knowledge quickly and easily (Sepehrdoust, 2018).

Through ICT also new markets are accessible at lower cost and efficient capital (Pradhan et al, 2018). Chen et al, 2018 emphasize that Internet access can promote sustainable entrepreneurial development and reduce costs. Several studies have discussed the importance of the use of ICT in several key sectors of the economy, such as the banking sector where it

Facilitates the relationship between banks and their customers and enhances banking performance (Ghita et al., 2016).

In the 2014 budget of RM54.6 billion was allocated for the education sector and out of this amount of RM168 million was for Internet access in schools (Budget 2014, MOF 2014). In light of the latest technological developments, many programs are being introduced in schools. These programs are being developed through a computer lab project by the Ministry of Education Malaysia for all primary and secondary schools to gain skills in technology as they prepare to compete for information.

The Information Technology and Communication Technology in Education will make information and

communication technology (ICT) a major enabler in the teaching and learning process. These measures enhance the quality of education and give rise to knowledgeable generations and contribute to the development of the country (MOE, 2013).

The Information Technology and Communication Policy in Education is a continuation of the Smart School initiative which emphasizes the use of technology to foster the development of creativity, collaborative learning, critical thinking and problem solving (MOE, 2013).

This policy integrates and coordinates all existing ICT initiatives such as SchoolNet, Computer Labs, EduWebTV, Access Centers and any other ICT initiatives implemented over time with the aim of increasing student achievement (MOE, 2013).

## **2. Literature Review**

The effective use of technology across the school system has been a subject of study by scholars in the United States since 2000 (Richardson & McLeod, 2011; Anderson & Dexter, 2005; Baylor & Ritchie, 2002; Bozeman & Spuck, 1991). There are also local studies that attempt to address the theme of this study. Among them are the studies of Kamala (2008), Leong Mei Wei (2010), Jamil (2011), Sathiamoorthy (2011), and Nordin and Norazah (2010). There are many evidence in the literature that confirms change in schools, especially adapting to change depending entirely on leadership (Leithwood, 2005). According to Achacoso, there is a lack of studies that explain how or why this occurs (Achacoso, 2003). Patricia M. Davies (2010) in her journal entitled 'Schools EducationTechnology Leadership' has shed light on past shortcomings about the lack of research on technology leadership, especially the definition of technology leadership, the role of technology leaders and to date no technology leadership model has been able to show exactly how the school's technology leadership can make teaching and learning the primary focus of the school. He has discussed the models of technology integration in education presented in the twelve journals he studied. According to Davies the models of technology integration do not clearly show how the

infrastructure and resources are developed in the context of technology integration and those models do not place teaching and learning as the main focus.

Researchers agree with Davies's (2010) opinion and argue that a model of technology integration in education should prioritize teaching and learning where theories and teaching methods should be used as platforms for integrating ICT equipment. A review of the research literature indicates that these past studies do not explain the specific relationship between technology integration in schools (especially in school operations and teaching and learning) with the technology leadership level. As such, this study will explore the use of technology in teaching and learning and school operations with the help of principled technology leadership.

Many evidences show that principals leadership behaviour influence on technology usage in schools (Anderson and Dexter, 2005) whose conclusions backed the claim that principals influence technology results through their leadership behaviour as defined by International Society for technology in Education (ISTE, 2014). ISTE suggests five critical areas to identify principals influence on technology outcomes: i) visionary leadership, ii) digital age learning culture, iii) excellence in professional practice, iv) systemic improvement, and v) digital citizenship.

### **1) Visionary leadership**

Educational Administrators inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support transformation throughout throughout the organization (ISTE, 2014).

### **2) Digital age learning culture**

Educational Administrators create, promote, and sustain a dynamic, digital age learning culture that provides a rigorous, relevant, and engaging education for all students (ISTE, 2014).

### **3) Excellence in professional practice**

Educational Administrators promote an environment of professional learning and innovation that

empowers educators to enhance student learning through the infusion of contemporary technologies and digital resources (ISTE, 2014).

#### **4) Systemic improvement**

Educational Administrators provide digital age leadership and management to continuously improve the organization through the effective use of information and technology resources (ISTE, 2014).

#### **5) Digital citizenship**

Education Administrators model and facilitate understanding of social, ethical and legal issues and responsibilities related to an evolving digital culture (ISTE, 2014).

### **2.1 Problem Statement**

The principal is a person responsible for creating creative learning and innovation among the members of his school organization (MOE, 2013). To ensure effective use of information and communication technology (ICT) in education, the ministry ensures that all teachers are trained and competent in using VLE by 2015 (Information Technology and Communication in Education Policy). The Ministry also provides more digital tools such as tablets or smartphones to teachers and students in an effort to create a creative and innovative learning environment (Information Technology and Communication Policy in Education).

All schools in Malaysia are encouraged to integrate ICT to enhance the effectiveness of the teaching and learning process while providing students and teachers with the challenges of the information and communication technology era (MOE, 2013). SSQS (Smart School Qualification Standards) is a star rating system achieved by schools throughout Malaysia. The purpose of implementing the SSQS is to evaluate best practices for ICT culture in 88 Bestari schools and extend it to all schools nationwide (MOE, 2013). This application is used for research and feedback on the culture and use of ICT in schools.

Manual use started in all smart schools and now applications have been built on the web and expanded to rank all schools throughout Malaysia

(MOE, 2013). SSQS is a guiding system for measuring the use of ICT in education in Malaysian schools and is the basis for policy planning and improvement of ICT programs in schools (MOE, 2013). In addition, it is expected to improve standards in education (MOE, 2013). It is the catalyst for change in education, and empower teachers and students (MOE, 2013).

Principals are very important individuals in realizing technology integration in schools (MOE, 2013). They are the implementer of education policy pioneered by the Ministry of Education Malaysia (MOE, 2013). Without strong cooperation all our country's education policies would not have been possible (MOE, 2013). Therefore, researchers want to explore the achievements in technology in terms of technology implementation led by school principals. In order to keep up with the current pace of change in the technology world, principals must strive to keep up with the current trends, in order to continue their education in line with the latest technology (MOE, 2013). In this regard, school leadership should strive to equip themselves with the knowledge and ability to use the technology (MOE, 2013). Some traits, charismatic personalities, or special skills that once made leadership great have been replaced by school leadership's ability to cope with complex changes and build organizations with a continuous learning culture (Anderson & Dexter, 2005). There is a bit of confusion from the past that technology influences teaching and learning, but studies to explain why it happens are very few (Achacoso, 2003).

In this study, the researchers wanted to study the relationship between the technology leadership behaviors of teachers and the use of ICT in school management, teaching and learning. Researchers also want to look at the technology leadership levels of these principals in the field of technology based on international measurement systems; which is based on the NETS-A (ISTE, 2009).

This study aimed to explore the extent to which secondary school principals use technology tools and software in their schools and their involvement in increasing the use of technology in schools.

Researchers also want to look at the technology leadership behaviours of these principals in the field of technology and the impact on technology achievement in their schools in accordance with international standardized measurement systems. This study is based on the National Education Technology Standards for Administrators also known as NETS-A (ISTE, 2009). These measures are designed to help administrators evaluate the technology direction in their schools: Visionary Leadership, Digital Learning Culture, Excellent Professional Practice, System Improvement; and the Digital Education Society.

This survey contains five areas as outlined in the above five standards.

### **3. Methodology**

This study uses a quantitative approach. In this study the written study tool as provided in appendix A is 'Teacher Leadership Technology Assessment', and appendix B is 'Teacher Computer Use Questionnaire'. This exploratory study was conducted randomly to test principals' leadership models and their relationship to teacher computer use.

#### **3.1 Sampling**

Researchers use Systematic sampling method for sample selection of principals. This technique is easier because the researcher can ensure that the number of selected respondents is sufficient. The survey respondents consisted of principals from selected secondary schools. In Systematic sampling, researchers organized each principal according to the districts in Kedah and randomly numbered the schools. Researchers selected odd numbers for all samples.

A total of 74 secondary schools involved in this study. The 74 principals from the selected schools were based on the principals' teaching experience, with principals having at least one year of experience. These principals and teachers must represent the same school. The total number teachers is 12131. According to the Krejcie Morgan table, 1970, the sample selected was 374 teachers.

The total population of teachers in the national secondary schools of Kedah is 12131, in the Krejcie and Morgan (1970) table it equals 374 samples.

#### **3.2 Instrument**

The construction of the research instrument is an important aspect of research as the results and conclusions of the study are based on the data collected. This study uses a quantitative approach. Two quantitative research instruments used in this study were the 'Principal Technology Leadership Assessment' (PTLA) developed and the 'Use of Teacher Computer' (TTU) Questionnaire.

An appraisal of principals related to this technology was first developed by a member of the University Council for Educational Administration located at the Advanced Education Center for Technology in Education, Minneapolis, Minnesota aimed at assessing the technology leadership of the school (UCEA, 2005). This study is based on the National Education Technology Standards for Administrators also known as NETS-A (ISTE, 2002).

The instrument 'STO' is an instrument for teachers developed by Alexandra B. Paige-Jones (2008). Researchers have been using the same instrument and translate it into Malay language.

#### **3.3 Survey Reliability and Validity**

Experts' opinion were used to establish the content validity of the items. Some items were dropped after they were found not suitable. The draft instrument was reviewed and revised accordingly before being sent to the respondents. A pilot test was conducted to measure the reliability of the instruments. A total of 40 principals and 150 teachers responded from different schools in Kedah and Perlis. The reliability of the instrument (PTL) is high with Cronbach alpha ( $\alpha$ ) = 0.826, while alpha ( $\alpha$ ) = 0.915 for TTU.

There are three objectives presented in this study:

- I.** To identify the leadership behaviors of technology leaders in schools based on the NETS-A national standards (ISTE, 2009).

- II.** To identify the relationship between technology leadership and computer use among the teachers studied. relationship of principal technology leadership (PLT) with computer use among the teachers studied (TTU).
- III.** To identify gender, age and experience variables of principals can moderate the

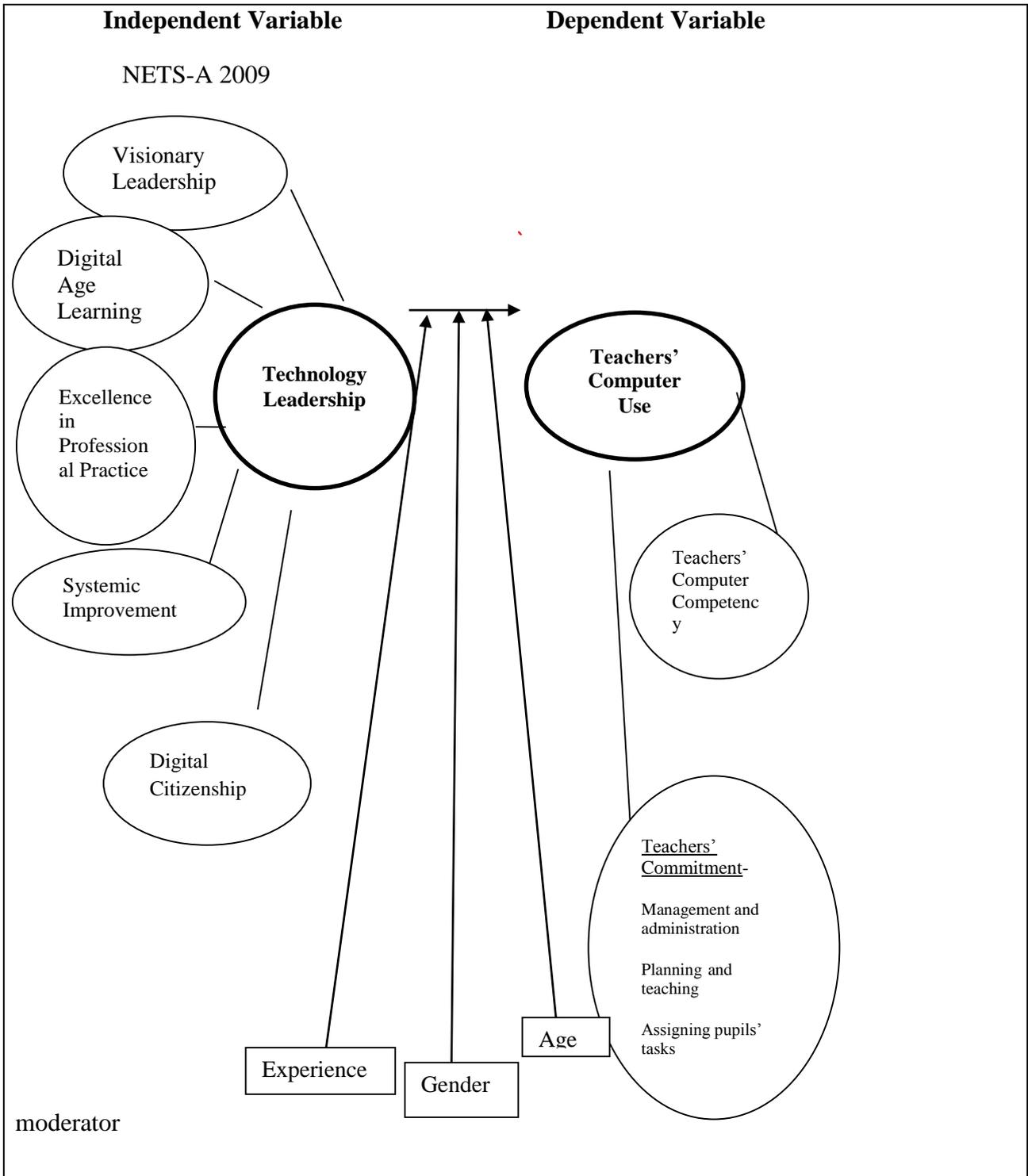


Figure 1. Study framework

**Table 1.** Distribution of Principal Technology Leadership (PTLA) Evaluation Items by Principal

Construct		Item Number	Total
1.	Visionary Leadership	1,2,3,4,5,6	6
2.	Digital Learning Culture	1,2,3,4,5,6	6
3.	Excellence in Professional Practice	1,2,3,4,5	5
4.	Systemic Improvement	1,2,3,4,5,6	6
5.	Digital Citizenship	1,2,3,4,5,6,7,8,9,10,11,12	12
		<b>Total</b>	<b>35</b>

Teacher Computer Use Questionnaire (TTU)

**Table 2.** Distribution of Teachers' Computer Use Questionnaire (TTU)

Item		Numbers	Total
1.	Computer technology competency in among the teachers	1-22	22
2.	Frequency of teachers to use computer for tasks administration and management	23-27	5
3.	Frequency of teachers using computers for planning teaching and during teaching	28-42	15
4.	Frequency of teachers use computer to give assignments to students	43-57	15
Total			57

### 3.3 Study Tools

Two quantitative research instruments were used in this study, the 'Principal Technology Leadership Assessment' (PTLD) and the 'Use of Teacher Computer' (TTU) Questionnaire.

Researchers have selected items based on the five constructs of the NETS-A Standard form the basis of measurement instruments was developed by a relevant body and consensus based on the knowledge-based opinions and skills of K-12 administrators namely: Visionary Leadership, Digital Age Learning Culture, Excellence Professional Practice, Systemic Improvement; and the Digital Citizenship.

This survey contains five areas as outlined in the above five standards. Each field contains between five and twelve questions per standard. The total number of questions are thirty five. This Likert scale test contains the following answer options: Not at all, Rarely, Occasionally, Frequently and Completely. A study was conducted by Jill L. Adelson and D. Betsy

McCoach in their survey measuring the Mathematical Attitudes of Elementary Students: The Effects of a 4-Point or 5-Point Likert-Type Scale. In the respondents' survey, elementary schools were able to answer Likert scale items with five answer options with neutral items at the centre of the choice. So, 5-Point Likert scale questions are appropriate.

### Data Analysis

The data and information collected in this study were analyzed through descriptive statistics and inference statistics. Data were analyzed using computer software, Statistical Packages for the Social Science (SPSS for Windows) version 20.0.

Levels of technology use of principals were measured based on the principals' answers in the Principal Technology Assessment (PTLA). The questionnaire was developed based on the NETS-A (ISTE, 2009). There are five standards in place to assist school leadership in the process of engaging with technology-related activities in schools.

**1. Result**

**Table 3.** Profile of Principals (n = 74)

Variables		Frequencies (n)	Percentage (%)
Gender	Male	34	45.9
	Female	40	54.1
Age	30 – 40 years	5	6.8
	41 – 50 years	26	35.1
	More than 50 years	43	58.1
Academic	Bachelor Degree	61	82.4
	Post Graduate	13	17.6
Technology Knowledge	Yes	29	39.1
	No	45	60.9
Experience as Principal	11 – 20 years	4	5.4
	21 – 30 years	34	45.9
	More than 30 years	36	48.6

**Finding**

The researcher performed a descriptive analysis to answer the first research question that measured the level of Leadership Technology (PTLA) based on

Moidunny's (2009) recommendation. Moidunny (2009) states that the mean score for the Principal Technology Leadership (PTLA) variable can be interpreted using the NETS-A standard values as shown in Table 4.8.

**Table 6.** Mean Score Based on NETS-An Interpretation

Mean Score	Interpretation
1.00 – 1.80	Very low
1.81 – 2.60	Low
2.61 – 3.20	Moderate
3.21 – 4.20	High
4.21 – 5.00	Very high

Source: Moidunny (2009)

**Table 7:** Summary of Principal Technology Leadership Interpretation (PTLA))

Construct	No. of Items	Mean	Std Deviation	Principal Technology Leadership Level (PTLA)
Visionary Leadership	6	3.888	0.513	High
Digital Learning Culture	6	4.068	0.528	High
Excellent Professional Practice	5	4.000	0.522	High
Systemic Improvement	6	4.018	0.508	High
Digital Citizenship	12	3.753	0.632	High

**To Measure Teacher's Technology Integration in Classrooms**

Descriptive analysis was also conducted to look at the level of use of computers in school management, teaching and learning. The levels of computer use in

school management, teaching and learning among the 374 teachers teaching at the SMK throughout the state of Kedah are shown in Table 8. Based on Table 4.10, the researchers found that the mean and standard deviation of each tested construct was high. Determination of the level of computer use among teachers is based on the views of Jamil (2002) quoted from Hamzah, Juraime, Hamid, Nordin, N and Attan (2014), mean values ranging from 1.00 to 2.33 (low),

2.34 to 3.66 (medium) and 3.67 to 5.00 (high). In this study, the whole construct was categorized as simple. The Competency construct had mean values ( $\bar{X}$ = 3.641, SD = 0.583) followed by the Administration and management constructs ( $\bar{X}$ =3.454, SD = 0.532). Next, the Teaching and Learning Planning construct ( $\bar{X}$ = 3.400, SD = 0.584) and finally the Student Assignment construct ( $\bar{X}$ = 3.259, SD = 0.652).

**Table 8.** Summary of Teacher Computer Use Levels (TTU)

Construct	No. of Items	Mean	Std Deviation	Level of Teachers' Computer Usage (TTU)
Competency	23	3.615	0.583	Moderate
Administration and Management	5	3.454	0.532	Moderate
Teaching Plan and Learning	18	3.400	0.584	Moderate
Pupils' Assignment	11	3.259	0.652	Moderate

**Inferential Analysis**

A descriptive analysis of the second research question was conducted to clarify the relationship between Principal Technology Leadership (ID) and Teachers Technology Use (TTU) in schools. The second research question is based on school census data as shown in Table 9. Testing is also carried out using the null hypothesis as follows:

Hypothesis: There is no relationship between the technology leadership of principals and the use of technology among the teachers studied.

In this study, a simple linear regression analysis was performed to explain the relationship between Principal Technology Leadership (PTL) and Teacher Computer Use (TTU). The coefficient of regression for the independent variable of principal technology leadership is equal to zero when computer use among teachers is the dependent variable (Ho:  $\beta = 0$ ).

In addition, the researchers also reported the level of Principal Technology Leadership (PTL) measured based on the score obtained by ANOVA test. Thus, the study found that the Principal Technology Leadership (PTL) level measured by the score obtained was not a good predictor of teacher

Computer Use (TTU) constructs with a F value of (1,73) = .475, p = 0.493. This is because the p value is greater than .05 (p> .05). Therefore, the relationships obtained are not significant. The regression equations used to make these estimates are as follows: -

Computer Use in Teachers (TTU) = 724,952 + 1,982 (Principal Technology Leadership).

Based on these equations, a change of one-unit scores in the Principal Technology Leadership (PTLA) variable could not improve the Teacher Technology Integration (PT) level by a value of p = .0493 (> 0.05). Thus, through the formulation, it shows that there is no significant relationship between Principal Technology Leadership (GTP) variables and Computer Use in Teachers' Groups (TTU).

Table 4.12 reports ANOVA results for degrees of freedom, mean squared, F test and normality. Table 10 reports the regression equation to look at the relationship between Principal Technology Leadership (PTLA) and Computer Integration among Teachers (TTU).

**Table 10:** ANOVA RESULT ANOVAa

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	34536.466	1	34536.466	.475	.493 <sup>b</sup>
	Residual	5232103.480	72	72668.104		
	Total	5266639.946	73			

a. Dependent Variables: Teachers' Computer Usage (TTU)

b. Predictors: b. (Constant), Principals' Technology Leadership (PTLA)

**Table 11:** Estimated Parameters (Coefficients<sup>a</sup>)

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	724.952	395.901		1.831	.071
	PTLA	1.982	2.875	.081	.689	.493

a. Dependent Variable: TTU

### Track Analysis Evaluation

The trajectory analysis was performed to test the direct relationship between the variables used in the second order construct (Hair et al., 2017; Henseler et al., 2009). The evaluation of the trajectory analysis in this study model involves the direct relationship between Principal Technology Leadership (PTL) and Teacher Computer Use (TTU). Table 12 shows the results of the evaluation of the structural model (direct effect) involving hypothesis testing of H01.

**Table 12.**

No.	Study Hypothesis	Original Sample ( $\beta$ )	Standard Deviation	T Value	P Value	Result
1	Principal Technology Leadership (PTLA) → Teacher Computer Use (TTU)	0.171	0.170	1.001	0.317	Not Significant

Note: Not Significant at significance level 0.05 (Two tailed) with t value <1.96 and p value > 0.05

### To Detect the Effect of Moderation

In this study, the evaluation to detect the effects of moderation was carried out using the following hypothesis:

Hypothesis H01 predicts that there is no significant relationship between Principal Technology Leadership (PTL) and Teacher Computer Use (TTU). The results of the H01 test were not significant ( $\beta = 0.771$ ,  $t = 35.004$ ,  $p < 0.05$ ). Therefore, the study hypothesis was rejected and the null hypothesis was accepted that there is no relationship between Principal Technology Leadership (PTL) and Teacher Computer Use (TTU).

H03: Principals age, gender and teaching experience variables cannot moderate the relationship between principal technology leadership and computer use among the teachers studied.

The results of the moderation test are reported as shown in Table 13. The results showed that all the study hypotheses were rejected ( $p > 0.05$ ) and the null hypothesis was accepted.

**Table 13.** Structural Model Assessment Results (Moderator Effects)

No.	Hypothesis	Original Sample ( $\beta$ )	Standard Deviation	t value	p value	Result
2	Moderator Effect (Age) PTLA $\rightarrow$ TTU	-0.017	0.048	0.347	0.365	Not Sig.
3	Moderation Effect (Gender) PTLA $\rightarrow$ TTU	-0.046	0.055	0.856	0.196	Not Sig.
4	Moderation Effect(Principal's Teaching Experience) PTLA $\rightarrow$ TTU	-0.037	0.053	0.713	0.238	Not Sig.

**4.10 Test of Determination Coefficient ( $R^2$ ) of Secondary Constructors**

Determination coefficients are based on (i) Chin (1998) - suggesting a  $R^2$  value of 0.19 produces weak influence, 0.33 produces moderate influence and 0.75 produces strong influence and (ii) Hair et al. (2017) - stated  $R^2$  values 0.25 as weak, 0.50 as moderate and 0.75 as strong. Thus, the larger the value of  $R^2$ , the greater the variance in the variance

and the better the relationship between the variables (Goltz et al., 2010).

In this study the value of  $R^2$  for Teacher Computer Use (TTU) was 0.059. This means that 5.9 per cent of the variance in teacher computer use (TTU) construction can be explained by the Principal Technology Leader (PTL). The coefficient of determination ( $R^2$ ) for the construction or variable of the Use of Teacher Computer (TTU) is shown in Table 14

**Table 14.** Test of Determination coefficient,  $R^2$

Variable	$R^2$ Value
Teachers Computer Use (TTU)	0.059

**Stone-Geisser Predictive Relevance Rating (Q2)**

Geisser (1974), Hair et al. (2017) and Stone (1974) state that the value of Q2 is greater than 0 ( $Q2 > 0$ ) meaning that the predictor construct has a predictive relevance to the outcome construct. Based on the assessment of relevance forecasts, the researchers

found that the Gender of Principals, Principal Technology Leadership (PTL), Digital Age Learning Culture, Systemic Improvement, Principal Experience and Age of Principals had a predictive of -2.3 percent on Teacher Computer Use (TTU). Table 15 shows the predictive relevance (Q2) for teacher computer use (TTU) constructs

**Table 15.** Stone-Geisser Predictive Relevance Assessment, Q2

Construct	SSO	SSE	$Q^2 (=1-SSE/SSO)$
Gender	374	374	
Principal Technology Leadership	1,122.00	1,122.00	
Digital Learning Culture	374	374	
Systemic Improvement	374	374	
Principal Experience	374	374	
Principal Age	374	374	
Teacher Computer Use	1,496.00	1,530.76	

Note: SSE= Sum Square of Errors of Prediction, SSO = Sum Square of Original Values

## 5. Discussion

The overview of the study findings discusses in detail each finding. This section discusses the findings of statistical studies from principals and teachers. For this purpose, the study findings were analysed statistically using IBM SPSS Statistics (SPSS) software and inference statistics using SEM SmartPLS (PLS-SEM). In this survey, the researchers found that the principals involved in this study showed a willingness to apply the skills and use of technology to themselves, teachers and indirectly to students as well. When principals recognize their role as school leaders, they will work to improve computer skills in school.

The findings show that technology leadership as a whole is high for this Standard 1 Nets\*A-Leadership standard. All respondents involved in planning technology activities at their respective school levels. 63.5 percent answered regularly. This shows the commitment of school principals in their efforts to increase the use of technology in their schools.

The role of the principals in this study is appropriate in the concept of the 'Smart School' created to integrate the use of technology in schools with the aim of achieving global competitive technology status (Hamsha,2011). To succeed in this global arena of providing a competitive workforce, school principals need to contribute to the planning, development, communication, implementation, and evaluation of strategic plans that implement technology at the district and school level (ISTE, 2009). School principals need to implement funding policies, procedures, programs, and strategies to support the implementation of the shared vision represented in school and district technology plans and guidelines. Therefore, they need to implement strategies to initiate and maintain technological innovation and manage change processes in schools and classrooms (ISTE, 2009).

Digital Citizenship has the lowest mean value of 3.753 (Moidunny, 2009). However, it still demonstrates high technology leadership in which principals regularly encourage teachers to use technology-based systems to collect student

assessment / examination data. They also encourage teachers to use technology-based systems to access their teachers' teaching practices and competencies. Respondents access and evaluate technology-based management systems and operating systems for refurbishment or upgrading. The principal also evaluates the professional development management skills of the school to meet the needs of teachers in the use of technology. Only one respondent rarely assesses their teachers' competencies.

The principals surveyed have demonstrated that they are capable of demonstrating high technology leadership for the Digital Learning Culture construct with a mean value of 20.35, Excellence in Professional Practice 20.0 and Systemic Improvement with a mean value of 20.05. These three constructs are closely related to classroom management and teaching. Principals as technology leaders need to encourage teachers to seek out information and to conduct some research on pedagogical and instructional technology (Joseph, 2013) so that they can integrate this technology into the classroom whether it is a classroom or virtual classrooms. Principals also need to provide access to staff and ensure there is provision for purchasing, maintaining and improving technology grades (Anderson & Dexter, 2005); generating continuous financing is not just a budget (Gosmire & Grady, 2007). However, in this study the principals scored the lowest with a mean value of 3.753 for the Digital Education Society constructs. Although technology is recognized as one of the most important elements of a good school, only a few principals claim to have technological expertise (Gosmire & Grady, 2007). Principals need to use computer-based technology for instructional activities as well as improving teaching and learning processes, which can enhance students' interest and concentration (Joseph, 2013). In addition, principals should encourage teachers to use technology to support high-level thinking and problem-solving skills among students as well as provide teachers with opportunities to use instructional design in teaching and learning (Joseph, 2013). 21st century teachers need to integrate technology in education so scholars have created

some kind of model or framework for technology integration in education (Arumugam, 2014).

Today, technologists are of the view that the use of technology is strongly influenced by the content and knowledge domains needed to integrate technology in different subjects (Arumugam, 2014).

In this study, the researchers found that the practice of technology leadership of principals was not a factor influencing teachers' acceptance of computer use in schools. This is in line with the survey conducted by Page-Jones (2008) in his doctoral theses. The null hypotheses confirmed that there was no relationship between the practice technology leadership of principals (PTL) with teachers technology use in his study. The result is contrary to the findings of the research conducted by Fisher (2013), Franklin (2007), Hatlevic and Arnseth (2012), Jackson (2009), Leong (2010), Mohd Jamil (2011), Tan (2010), Ting (2007) and Wang (2010) found that the practice of technology leadership of principals is a factor influencing teachers' acceptance of computer use in schools. On the other hand, the researchers found that in schools of Kedah the practice of principals has shown high technology leadership in all constructs. In this survey, the researchers found that although the achievement of principals was high in all five constructs, teachers' achievements were the opposite. The research findings showed moderate results for all teachers. This is in contrast to the findings of the principal's technology practice. The findings of this study are also similar to those obtained at Texas High School where in the survey it showed high mean scores for all the technology standards of teachers as reported by Alan Seay (2004), Alkrdem (2014), Eren and Kurt (2011), Faridah (2011) and Mokhtar (2011).

To succeed in any field within an organization, it is the responsibility of the administrator to show good performance and example to his subordinates. The principals in this survey have shown that they can be proud of their performance and that it is the motivation for teachers to emulate it. They have carried out their responsibilities well and this is the first step in making the school environment more conducive to technology use. This is in line with the

claim made by Sathiamoorthy et al. (2011), where principals at school are aware of their role in technology development in schools, they can contribute at least 30 percent to teacher technology improvements as school leaders are willing to work together to improve technology integration. Although there is evidence in the literature confirming that change in schools is entirely dependent on leadership (Leithwood, 2005), there is still a lack of studies explaining how and why this occurs (Achacoso, 2003).

In this section, researchers outline the contribution of these surveys to principals, theories, teachers and economics and societies based on the findings.

### ***5.1 Implications for Principals***

Principals are the backbone of schools where they are the nation's hope to boost the use of technology in schools and thus stimulate teaching and learning in schools to produce tech-savvy workers so that the country can compete with developed countries in various fields. This survey confirms that principals surveyed dominate all constructs based on the NETS-A national standards (ISTE, 2014). The principal is a person responsible for creating creative learning and innovation among the members of his school organization (MOE, 2013). In line with the explosion of the Industrial Revolution 4.0 principals need to apply education that provides students with a high-skilled workforce to develop software systems, artificial intelligence, designers and programmers as they are needed.

### ***5.2 Implications for Theory***

This survey contains a variety of teaching and learning theories that teachers and principals can use in teaching and learning in the classroom whether the classroom is permanent or the classroom in the classroom. This enables educators to learn and choose the right theories to implement in school. The findings show that principals carry out their tasks in accordance with the NETS-A standard (ISTE, 2014). These measures are designed to help school administrators evaluate the technology direction in their schools. Researchers have found that Digital Learning Culture is at the forefront of System

Improvement, Excellent Professional Practice, Visionary Leadership and Digital Citizenship.

### **5.3 Implications for Teachers**

The involvement of teachers in this survey reflects that teachers are aware of their increasingly challenging task and want to work with school administrators to increase their mastery of students and technology. Teachers need to master the skills of communicating information to students whether in the classroom, computer lab or in the classroom. Knowledge transfer skills to students must be in line with proficiency in the use of computer hardware and the use of appropriate teaching and learning approaches such as TPACK which was popularized by Mishra and Koehler, 2006.

There are three core components of technology integration in teaching: content, pedagogy, and technology, and the relationships between them. The three fundamentals of science (content, pedagogy, and technology) constitute the core framework of technology, pedagogy, and content knowledge (TPACK). Teachers need to apply enough knowledge to develop technology such as producing code and algorithms and developing a simple application system for students to develop. If early exposure to Industry 4.0-related technology is possible and encouraged, this highly skilled workforce will be able to create schools according to market needs. Information and processes to gain knowledge about developing a technology are easily accessible and learned through the Internet and are largely free.

The rapid change in the industry requires schools and the community to be the catalyst for the Industrial Revolution 4.0, so teachers must change as well.

### **5.4 Implications to the country's economy and social**

The impact of information and communication technology on the country's economic and social development is high as the increasing use of ICT can boost GDP growth, productivity and employment, where many empirical studies have proven this (Ghita et al., 2016). In addition, it can help save the cost of any agency (Chen et al, 2018) whether private

or government. ICT can influence economic growth through several channels indirectly to trade (Meijers, H, 2014), namely: production of goods in services in the ICT sector but it contributes directly to the creation of goods and services in the economy; use of ICT goods and services is input into production and other services; increasing productivity in the ICT sector contributes to the overall productivity of the economy; in other sectors, the use of ICT contributes to efficiency and productivity.

### **5.5 Summary**

The researcher performed a descriptive analysis to answer the first research question that measured the level of Principal Technology Leadership (PTL) based on the recommendation of Moidunny (2009). The researchers found that the mean score for the Principal Technology Leadership (PTL) variable and its five constructs were high. Researchers have found that the mean value of the Digital Learning Culture construct is highest followed by Systemic Improvements, Excellent Professional Practices, Visionary Leadership and Digital Education Society.

The principals involved in the study showed a willingness to apply the skills and use of technology to themselves, teachers and indirectly to students as well. However, through simple linear regression analysis conducted to explain the relationship between Principal Technology Leadership (PTL) and Teacher Computer Use (TTU), it is evident that through the formulation, it is evident that there is no significant relationship between Principal Technology Leadership variables (PTL) ) with the Use of Computers within Teachers (TTU). The regression equations used to make these estimates are as follows: - Computer Use in Teachers (TTU) = 724,952 + 1,982 (Principal Technology Leadership). Based on these equations, a change of one-unit scores in the Principal Technology Leadership (PTL) variable could not improve the Teacher Technology Integration (TTU) level by a value of  $p = .0493 (> 0.05)$ .

In this study, researchers found that the variables of age, gender and work experience of teachers failed to prove that they were variables that could moderate

the relationship between principal's technology leadership and computer use among the teachers studied.

### **5.6 Conclusion**

The research conducted by researchers is not frequently carried out by researchers in Malaysia. The rapid explosion of the computer industry has led to various technological innovations around us. The field of technology encompasses many areas of interest so people are keen to learn it, so it is imperative that our schoolchildren move forward if we are to see our students in line with students in develop countries.

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