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# Effect of Principal's Technology Leadership on Teacher's Technology Integration

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Technology has changed the way people live .The role of school leadership, teaching approaches, and school innovation have also changed in the industrial era 4.0 due to advanced technology such as Artificial Intelligence and the internet. Moreover, the challenges facing school administrators today different than their predecessors, since many factors influence the integration of technology in schools some of these are lack of ICT training, teachers 'competence in ICT, and access to ICT resources. Considering Leadership is the key agent in the effective implementation of technology in schools. This research aimed to investigate the influence of principals' technology leadership and professional development on teacher's technology integration with gender and experience as moderation variables. In this cross-sectional survey, random sampling was carried out to select 442 principals and 953 teachers from Palestinian public schools. Two different questionnaires were used the first one was based on National Education Technology Standards –Administrator, NETS-A (2014) and Survey of Technology Experiences for school principals while the second instrument is Learning with ICT: Measuring ICT Use in the Curriculum for the teachers. Numerical data were analyzed quantitatively using two software the Statistical Package for the Social Sciences SPSS Version 23.0 and Smart PLS. The finding showed that the levels of Technology Leadership of the five constructs (systemic improvement, visionary leadership, excellence in professional practice, digital age learning culture, and digital citizenship), professional development and teacher's technology integration were at high levels. Based on the results of the data analyses there is a positive significant relationship between the five constructs of technology leadership and professional development with teacher's technology integration in the Palestinian public schools in the west bank.

Keywords: principals' technology leadership, professional development, teacher's technology integration, NETS-A, smart PLS

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## INTRODUCTION

The modern era is characterized as the age of information and communication technology, leaving no sphere of life left untouched by the influence of ICTs. This revolution has imposed changes in various aspects, including education, and its management, which is one of the largest areas. The role of school leadership, teaching approaches, and school innovation changed in the industrial era 4.0 due to advanced technology such as Artificial Intelligence and the internet. Moreover, the challenges facing school administrators today different than their predecessors, Uğur & Koç (2019) see that infusing technology into the curriculum is one of the major challenges for administrators these days. In the period 2011-2015, the Palestinian Ministry of Education and Higher Education implemented a project financed by Belgium, titled "E-learning Curriculum in Primary and Secondary Education". One of its aspects was School-Led initiatives (SLIs) to utilize ICT in education. But, when evaluating e-learning and ICT in education in the Palestinian primary and secondary schools findings revealed that despite the efforts to implement ICT in school education, it is not yet at the desired level (Al Sabah, 2020).

Recently, based on the feedback of the follow-up & evaluation report 2018 prepared by the Palestinian Ministry of Education to follow up on the strategic plan adopted by the Ministry results showed that the percentage of digital teaching tools used in classes is just 23% and, it was just 28.2% that technology classes employ specialized technologies tools as the report revealed, while the ministry target by the year 2022 is 55%, so more effort should be involved to promote technology integration in schools (Ministry of education, 2019). Moreover, Barham (2014) in a study that aims to find ways to help Palestinian secondary schools to integrate technology effectively into education found that integration of technology into Palestinian schools is still oriented toward a traditional approach.

Acting as technology leaders are what Principals who can carry out technology implementations in their schools should behave (Demski, 2012). There are several factors that affect the integration of information and communication technology in schools. It is not enough to make it available in schools for students to ensure its integration (O'Dwyer *et al*. ,2004) Some of these factors are related to principals through their understanding of the best practices to apply to insure technology integration in thier schools beside , their awareness of the importance of professional development in the technology field, which helps them in the effective implementation of technology in their schools. All this is not independent of the role the society plays in pressuring school principals to use technology in the schools for educational and administrative purposes (Dias, 2001 ; Papaioannou & Charalambous , 2011).

Although there is consensus on the importance of the principal's role in ensuring the integration of ICT through the facilities he provides and his ability to influence others to accept and use ICT to ensure its integrity Brockmeier, *et al*. ,2005; Neufeld, Dong, & Higgins, 2007; Wei *et al*., 2017) , according to Levin & Datnow (2012) most studies have not directly indicated to this important role.

According to Abu al rub (2010) which considered the lack of standards that emphasize technical skills of principals before they are assigned in the Palestinian schools one of the administration- related obstacles in using technology in schools, and this will lead to making them least responsible as technology leaders which are probably one of the contributing factors to the failure of the technology implementation in education, this result aligned with Abdullah *et al*. (2015) reached that the lack of technology integration by principsls and teachers is due to inefficiency and limited access to ICT. Sathiaorthy *et al*. (2011) found that when school principals prepared for their emerging role and realize their role as a technology leaders, they can influence teachers and change thier attitudes to accept technology and helping them to enhance their ICT skills.

**Literature Review**

School leaders play a crucial role in determining and shaping the success of ICT implementation and integration in education at the organizational level (Byrom & Bingham, 2001; Neufeld *et al*., 2007; Stuart, Mills, & Remus, 2009; Raman & Thannimalai, 2019). Integrating technology and leadership skills lead to the strength of technology leadership (Chua & Chua, 2017).

DasGupta (2011) when reviewing seventy-seven journal articles regarding technology leaders conclude that "there does not appear to be any serious disagreement amongst scholars on technology leadership" However, research gaps in the topic of technology leadership have been reported by many researchers (Albion, 2006; Davies,2010; McLeod & Richardson, 2011; O'Dwyer *et al*., 2004). Several studies have recommended the necessity of conducting researches on the impact of technological leadership on the technology integration among teachers (McLeod & Richardson, 2011) the associated identification of professional development needs for school leaders, especially development programs for technical leadership and the related guidelines prepared for leaders (O'Dwyer et al. 2004; Albion, 2006; Davies 2010 ; Raman & Thaannimalai, 2019). ). Raman, & Thannimalai (2019) highlights the importance of studying gender as a moderating variable between technology leadership and teacher's technology integration, and other factors such as school location and school climate.

A guideline for school principals to understand their role as technology leaders so that they can accomplish technology integration in the educational process is National Education Technology Standards-Administrator (NETS-A) (Sincar, 2013). What most previous studies did not address is analyzing the relationship between the (NETS-A) constructs for Technology Leadership (Visionary Leadership, Excellence in Professional Practice, Digital Age Learning Culture, Systemic Improvement, and Digital Citizenship); nor did these studies focus on the importance and performance of these five constructs with the technology integration in schools (Leong. et al., 2016; Raman & Thannimalai, 2019; Hamzah et al., 2014; Machado & Chung,2015; Raman & Halim Mohamed, 2013) nor studying professional development of the school principals as a technology leaders in thier schools instead they study the (NETS-A) as a whole (Alkrdem, 2014 ;Richardson and McLeod ,2011; Badri et al. ,2016; Raman & Thannimalai ,2019 ) therefore, this paper studied this prevailing gap.

The U.S. Department of Education (2005) defined technology Integration as a" combination of technology resources (computer and specialized software), network-based communication systems, tools, and other infrastructure, and technology-based practices that have been integrated into daily routines and student activities in the classroom". While, Guskey & Sparks (1996) defined professional Development as "the processes that enhance attitudes, skills, and knowledge about the career, including training in services, coaching, and other activities".

The inconsistency was palpable in previous research on gender concerning leadership (Eagly, 1995). In Saudi Arabia Alkrdem (2014) study showed that "headteachers" technological leadership behavior did not differ regarding their gender; however, according to Banoglu (2011), in Turkey, male technology leaders were less effective compared with female technology leaders. In the United States, Waxman *et al.* (2013) declare that gender influences how leaders perceive the functions of technology in their schools. While Hamzah et al., (2014), Leong et al., (2016), Raman & Thannimalai, (2019) reveals that technology leadership did not affect by the school principals gender while, (Seyal, 2012) showed that gender significantly affect principal's ICT while experience as school leaders has no significant effect on principal's ICT usage. From teacher's perception of the principals' technology leadership a study conducted by Chang et al. (2008) in the Taiwanese Elementary Schools revealed that there were significant differences in teachers' perception of all principals' technology leadership dimensions according to age, teaching experience.

Few studies linking ISTE- (2014) with other variables such as acceptance and use of ICT. Wei, et al. (2017) investigate the level of principal technology leadership practices and teacher acceptance and use of school management system (SMS), finding that there is a significant positive correlation that is moderately strong between principal technology leadership practices and teacher acceptance and use of SMS, the same finding concluded by Leong (2017) when investigating teacher's perception on the level of principal technology leadership practices, with the level of teacher ICT competency, and teacher acceptance and use of school management system (SMS). These results are depending on teacher's perceives and points of view while, other studies study the influence of Principals' Technology Leadership and Professional Development on Teachers' Technology Integration from the point of view of principals and teachers (Thannimalai & Raman, 2018).

Technology leadership consists of all activities related to technology in the school, including the organization's decisions, policies, and implementation of technology. To ensure increased use of the Internet, integration of technology, and use of technology tools by students in schools, there is a need for strong technology leadership (Thannimalai & Raman, 2018 ), and when talking about school technology leadership, the empirical studies and literature of Anderson and Dexter (2005) cannot be neglected, as they are the most comprehensive in this field, in addition to presenting a model based primarily on technological leadership. This model was distinguished by its explanation of the two-way relationship between technology leadership and infrastructure for school.

In summary, as Grissom and Harrington (2010) highlighted that there is a lack of research on professional development for principals while, there is much literature on professional development for teachers, it appears that there is an urgent need to investigate the current proficiency level of technology leadership among school principals. The following study adds to the critically needed body of research in this important field for 21st-century education. Studies using NETS-A standards, were very poorly conducted in western countries Metcalf (2012). However, no studies have been found researched the relationship of the five constructs of ISTE-Standards for Administrators (2014) with technology integration in Palestinian public schools. Therefore, this study is to demonstrate that the principal's leadership practices in school have a positive relationship with the integration of technology. This study analyzed the importance of the five constructs of technology leadership (systemic improvement, visionary leadership, excellence in professional practice, digital age learning culture, and digital citizenship), and professional development on technology integration of teachers. It also, examined the effect of experience & gender as moderators on the relationship between principals' technology leadership and teachers' technology integration at Palestinian public schools in the west bank.

**Hypothesis**

**H1:** There is a positive significant relationship between the five constructs of technology leadership and professional development with teachers' technology integration.

**H2:** Experience is a moderating factor in the relationship between principals' technology leadership and teachers' technology integration.

**H3:** Gender is a moderating factor in the relationship between principals' technology leadership and teachers' technology integration (PT).

## METHOD

This study aimed to examine the relationship between Teacher's Technology Integration as the endogenous variable with principal technology leadership practices and professional development as the exogenous variables while studying gender and experience as moderating variables. Thus, to achieve the objectives of the study, the quantitative research method was applied to find out how one variable affects another (Creswell, 2012) or to establish a relationship between the variables (Fraenkel, Wallen, & Hyun, 2011). Since this is a non-experimental quantitative study, it is appropriate for the design of this study to use the survey technique by developing a number of questionnaires to collect data, so the sectional and self-administrative questionnaire is the data collection tool for this study.

### Population and Sampling

All public-school principals and teachers in the west bank of Palestine consist the population for this study. There are (35,662) teachers within (1,792) schools located in seventeen different districts in West Bank each school is headed by a principal. Electronic questionnaires were distributed online randomly to the respondents and a total of (442) principal & (953) teacher questionnaires were collected and analyzed.

**Instrumentation**

Two different questionnaires were used one for school principals and the other for technological teachers. A questionnaire was developed for technological leadership based on concepts from ISTE (2014) and *technology experience surveys* (Billheimar, 2007). And to measure technological teacher integration, *Learning with ICTs: Measuring ICT usage in* a curriculum tool adopted and modified from Jamieson-Proctor *et al*. (2005, 2010) was the instruments used in this study. These instruments were translated by a professional to Arabic to ensure items had the same meaning after translation.

**Survey Reliability and Validity**

Three educational experts evaluated the instruments used for the study purposes before sending them to the Ministry of Education for review to obtain approval to apply the instruments in the Palestinian public schools.

To insure the validity and readability of the study instruments a pilot study was carried. The shows that the reliability of the principal's instrument was accepted with Cronbach's alpha (α) =0.894 and Learning with ICT: Measuring ICT Use I the Curriculum Instrument also had very high reliability of Cronbach's alpha (α)= 0.847**.**

**Data Analysis**

Numerical data gathered were analyzed quantitatively using two software the Statistical Package for the Social Sciences (SPSS) Version 23.0 and Structural Equation Modeling - Partial Least Squares (Smart PLS 3). Both descriptive and inferential statistical methods were used to analyze the data using SPSS. SEM procedure with Smart PLS was carried out to assess the moderating effect of experience and gender on the relationship between principal technology leadership practices and teacher's technology integration.

**FINDINGS**

**Principals' characteristic**

The descriptions of the respondent's profiles are presented in terms of the descriptive statistic using frequency and percentage. the total number of teachers female respondents is more than the teacher male respondents with the percentage of 68.6% female compared to 31.4% male. As for principals, 52.7% of them were male and 47.3% of them were female respondents. The distribution of respondents by age for principals showed that most respondents were in the age of 41-50 years old (46.6 %), followed by 51-60 years old (32.8 %). As for teachers, the distribution of respondents by age showed that most respondents were in the age of 31-40 years old (44.6 %), followed by 41-50 years old (27.3 %).

A total of 51.5 % of principal's respondents have been principal's for less than five years, while 76.7% of respondents teachers have teaching experience of more than 5 years. In terms of highest educational level, majority of principals (71.7%) have Bachelor's degree, while only 5% of them have diploma qualification and 23.3% of them possess postgraduate qualification either in master or doctorate. For teachers, 80.5% of them have Bachelor's degree, while only 8.8% of them have diploma

qualifications and 10.7% of them possess postgraduate qualification either in master or doctorate.

**Principal's technology leadership, professional development, and teacher technology integration level in Palestinian public school**

Depending on the Moidunny (2009) scale, the mean of the five technology leadership construct ranged from 3.84 to 4.34 which indicates that the mean score was very high level for all construct, except for digital citizen it was high(Mean=3.84). Also, the mean of the teacher's technology integration (Mean=4.20) indicates a high level of teacher practices of technology in their classes. Results show that professional development indicates a low level with (Mean=2.16).

**Measurement Model Evaluation**

There are three main stages to evaluate the measurement models to do that: the assessment of internal consistency reliability, convergent validity, and discriminant validity. (Hair *et al*., 2014).

**Internal consistency reliability**

The internal consistency was assessed by the Cronbach's alpha coefficient (CA) and the Composite Reliability (CR), as shown in Table 1, the CA value for construct were found to range from 0.729 to 0.939, which indicates an excellent internal consistency among the constructs (Hair *et al*., 2010). The CR was 0.818 and above for all constructs, which satisfactorily meets the cut off value, suggested by Hair *et al*. (2017) that values above 0.70 are considered satisfactory.

**Convergent validity**

Both outer loading and Average Variance Extracted (AVE) were used to assess the convergent validity of the measurement model. According to Hair et al. (2010) the item with outer loading more than 0.50 can be accepted in the model, furthermore, Fornell & Larcker (1981) suggested that the AVE should be greater than 0.50, but if AVE greater than 0.40 and the CR is greater than 0.60, the convergent validity of the construct still adequate. Referring to the result in Table 2 which shows that the outer loading of all items was between 0.548 and 0.909, that indicates all items are acceptable, while the result of AVE values of all construct was suggesting convergent validity is ensured.

**Discriminant validity**

Table 2 reports the result of discriminant validity of constructs, which were examined by the Fornell-Larcker criterion and cross loading criterion respectively. The Fornell-Larcker criterion is more conservative to examined the discriminant validity, it compares the square root of the AVE values of each construct in the matrix diagonal with the paired construct correlation (off-diagonal). It can be seen that all values of the square root of AVE are greater than the constructs correlation, thus the discriminant validity is satisfied (Fornell & Larcker, 1981), the higher correlation found between pairs of the construct was between digital age learning culture and excellence in professional (0.815). The second criterion is cross loadings of indicators, according to

Chine (1998) the indicator's outer loading on the associated construct is greater than all of it's loading on other constructs, which was find confirms the discriminant validity.

Table1
Result of the measurement model

| Construct | Indicator | Outer loading | CA | CR | Average Variance Extracted (AVE) |
|---|---|---|---|---|---|
| Visionary Leadership (VK) | | | 0.729 | 0.880 | 0.786 |
| | KV1 | 0.863 | | | |
| | KV2 | 0.909 | | | |
| Digital Age Learning Culture (BP) | | | 0.876 | 0.910 | 0.669 |
| | BP1 | 0.826 | | | |
| | BP2 | 0.823 | | | |
| | BP3 | 0.802 | | | |
| | BP4 | 0.850 | | | |
| | BP5 | 0.787 | | | |
| Excellence in Professional Practice (KP) | | | 0.831 | 0.898 | 0.747 |
| | KP1 | 0.851 | | | |
| | KP2 | 0.858 | | | |
| | KP3 | 0.883 | | | |
| Systemic Improvements (PS) | | | 0.864 | 0.902 | 0.649 |
| | PS1 | 0.854 | | | |
| | PS2 | 0.835 | | | |
| | PS3 | 0.798 | | | |
| | PS4 | 0.797 | | | |
| | PS5 | 0.739 | | | |
| Digital Citizenship (KD) | | | 0.799 | 0.881 | 0.712 |
| | KD1 | 0.872 | | | |
| | KD2 | 0.837 | | | |
| | KD3 | 0.822 | | | |
| Teachers' Technology Integration (PT) | | | 0.939 | 0.945 | 0.465 |
| | PT1 | 0.618 | | | |
| | PT2 | 0.632 | | | |
| | PT3 | 0.619 | | | |
| | PT4 | 0.651 | | | |
| | PT5 | 0.703 | | | |
| | PT6 | 0.699 | | | |
| | PT7 | 0.677 | | | |
| | PT8 | 0.694 | | | |
| | PT9 | 0.723 | | | |
| | PT10 | 0.720 | | | |
| | PT11 | 0.747 | | | |
| | PT12 | 0.707 | | | |
| | PT13 | 0.717 | | | |
| | PT14 | 0.656 | | | |
| | PT15 | 0.722 | | | |
| | PT16 | 0.721 | | | |
| | PT17 | 0.706 | | | |
| | PT18 | 0.670 | | | |
| | PT19 | 0.665 | | | |
| | PT20 | 0.547 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Professional Development (PD) | | | 0.734 | 0.818 | 0.474 |
| | PD1 | 0.635 | | | |
| | PD2 | 0.640 | | | |
| | PD3 | 0.716 | | | |
| | PD4 | 0.671 | | | |
| | PD5 | 0.773 | | | |

Table 2
Fornell-Larcker Criterion

| | VK | BP | KP | PS | KD | PT | PD |
|---|---|---|---|---|---|---|---|
| VK | 0.886 | | | | | | |
| BP | 0.732 | 0.818 | | | | | |
| KP | 0.640 | 0.815 | 0.864 | | | | |
| PS | 0.629 | 0.814 | 0.802 | 0.806 | | | |
| KD | 0.362 | 0.499 | 0.471 | 0.582 | 0.844 | | |
| PT | 0.519 | 0.646 | 0.616 | 0.668 | 0.582 | 0.682 | |
| PD | 0.288 | 0.317 | 0.344 | 0.331 | 0.320 | 0.322 | 0.689 |

Note: Diagonals represent the square root of each construct AVE. Off-diagonal represent the constraint's correlation.

**Structural model evaluation**

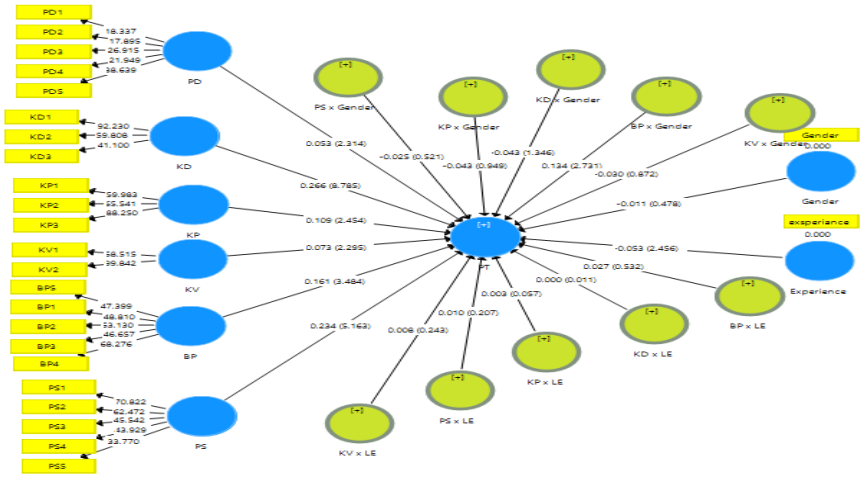


Figure 2
Structural model

After established the reliability and validity of the constructs, the second step proceeds to examine the structural model which estimates hypothesized paths between the constructs. To assess the structural model collinearity test, path significance, coefficient of determination, and predictive accuracy were used.

The first step to assess the structural model is the collinearity test, the value of Variance Inflation Factors (VIF) was ranged from 1.008 to 4.606, which indicates that there was

no presence of collinearity in the structural model since all Variance Inflation Factors of all construct are below 5 Hair *et al*. (2014).

To test the hypothesis, Partial Least Square (PLS) which is a non-parametric technique was used by running a bootstrapping procedure with a sub-sample of 5000, as suggested by Hair *et al*. (2017).

Table 3 shows the path coefficient of all hypotheses and its t-value with the associated p-value. From the result, we can support all the hypotheses. That is, there is a significant and positive relation between visionary leadership and teachers' technology integration (β=0.073,t=2.250) hypothesis $H_{1a}$, a significant and positive relationship between digital age learning culture and teachers' technology integration (β=0.161,t=3.474) hypothesis $H_{1b}$, there is a significant and positive relationship between teacher's technology integration and excellence in professional practice (β=0.109,t=2.379) hypothesis $H_{1c}$, systemic improvements (β=0.234,t=5.195) hypothesis $H_{1d}$, digital citizenship (β=0.266,t=8.650) hypothesis $H_{1f}$, professional development (β=0.053,t=2.270) hypothesis $H_4$.

Table 3
Path Coefficient of research direct hypothesis

| No. | Hypothesis | | | Coefficient ($\beta$) | Standard deviation | $t$ value | $p$ value | Result |
|---|---|---|---|---|---|---|---|---|
| $H_{1a}$ | VK | → | PT | 0.073 | 0.033 | 2.250 | 0.024** | Significant |
| $H_{1b}$ | BP | → | PT | 0.161 | 0.046 | 3.474 | 0.001*** | Significant |
| $H_{1c}$ | KP | → | PT | 0.109 | 0.046 | 2.379 | 0.017** | Significant |
| $H_{1d}$ | PS | → | PT | 0.234 | 0.045 | 5.195 | 0.000*** | Significant |
| $H_{1f}$ | KD | → | PT | 0.266 | 0.031 | 8.650 | 0.000*** | Significant |
| $H_4$ | PD | → | PT | 0.053 | 0.023 | 2.270 | 0.023** | Significant |

Note: *, **, *** indicate a significant relation at 10%, 5%, 1%.

**Coefficient of determination ($R^2$) and Predictive Relevance ($Q^2$)**

A major part of the structural model evaluation is the assessment of coefficient of determination ( $R^2$) and predictive relevance ($Q^2$) . The coefficient of determination ( $R^2$) represents the amount of variance in the endogenous construct that is clarified by all of the exogenous constructs, Hair *et al*. (2017) suggest that the $R^2$ value of 0.25, 0.50, and 0.70 are often used to the weak, moderate and strong coefficient of determination respectively, furthermore, Falk and Miller (1992) recommended that the minimum required value of $R^2$ at least 0.10. To assess the predictive relevance ($Q^2$) value of a blindfolding procedure relevance, Chin (1998) suggests that a model confirms a good predictive relevance when its value greater than zero. In another word, the zero value of $Q^2$ indicates that the exogenous constructs have predictive relevance for the endogenous construct under consideration Hair *et al*. (2014).

According to the result in Table 4 of $R^2$ and $Q^2$ , the value of $R^2$ indicates that the exogenous constructs explained 54.1% of the total variance of teachers' technology

integration, furthermore, the value of $Q^2$ indicates that the structural model had predictive relevance .

Table 4
Assessment of Coefficient of determination and Predictive Relevance

| Endogens variables | $R^2$ | SSO | SSE | $Q^2 = 1 – SSE / SSO$ |
|---|---|---|---|---|
| PT | 0.541 | 19060 | 14358.087 | 0.247 |

Note: SSO= Total Sum of Square; SSE= Sum of Square due to error

**Effect Size $f^2$**

The effect size $f^2$ is used to estimate the effect of specific exogenous constructs that contribute to an endogenous construct using the change in if it deleted from structural model Chin (1988). Cohen (1988) suggest that the $f^2$ value of 0.02, 0.15, and 0.35 are often used to small effect, medium effect , and large effect, respectively. From the result of Table 5, the exogenous variables (visionary leadership, digital age learning culture, excellence in professional practice, professional development, gender, and experience) have a very small effect size, where systemic improvements and digital citizenship have a small effect size.

Table 5
The Effect size of exogenous constructs

| Exogenous constructs | $f^2$ | Effect size |
|---|---|---|
| KV | 0.005 | Very small effect |
| BP | 0.015 | Very small effect |
| KP | 0.006 | Very small effect |
| PS | 0.027 | small effect |
| KD | 0.105 | small effect |
| PD | 0.005 | Very small effect |
| Gender | 0.000 | Very small effect |
| Experience | 0.006 | Very small effect |

**Gender and Manger Experience as Moderating Variables**

In this study, two moderate variables were used, gender and leadership experience, the result in Table 6 indicates that gender is moderate variables between digital age learning culture and teachers' technology integration (β=0.134,t=2.761) that support hypothesis $H_{2b}$ , while the hypothesis $H_{2a}$ , $H_{2c}$ , $H_{2d}$ , $H_{2f}$ ,are not supported, that's mean gender does not have a moderating effect between visionary leadership, excellence in professional practice, systemic improvements, digital citizenship and teachers' technology integration. Regarding to principal's experience, the result indicates that all hypotheses from $H_{3a}$ to $H_{3f}$ were not supported, that is means the principal experience does not have a moderating effect between all five constructs of technology leadership and technology integration .

Table 6
Moderating effect assessment

| No. | Hypothesis | | Coefficient (β) | SD | | | Result |
|---|---|---|---|---|---|---|---|
| | | | | | $t$ value | $p$ value | |
| $H_{2a}$ | VK×Gender | → PT | -0.030 | 0.033 | 0.893 | 0.372 | Not Significant |
| $H_{2b}$ | BP ×Gender | → PT | 0.134 | 0.048 | 2.761 | 0.006*** | Significant |
| $H_{2c}$ | KP×Gender | → PT | 0.003 | 0.047 | 0.057 | 0.955 | Not Significant |
| $H_{2d}$ | PS ×Gender | → PT | 0.010 | 0.047 | 0.206 | 0.837 | Not Significant |
| $H_{2f}$ | KD×Gender | → PT | 0.000 | 0.032 | 0.011 | 0.991 | Not Significant |
| $H_{3a}$ | VK×LE | → PT | 0.008 | 0.033 | 0.246 | 0.806 | Not Significant |
| $H_{3b}$ | BP ×LE | → PT | 0.027 | 0.051 | 0.526 | 0.599 | Not Significant |
| $H_{3c}$ | KP×LE | → PT | 0.003 | 0.047 | 0.057 | 0.955 | Not Significant |
| $H_{3d}$ | PS ×LE | → PT | 0.010 | 0.047 | 0.206 | 0.837 | Not Significant |
| $H_{3f}$ | KD×LE | → PT | 0.000 | 0.032 | 0.011 | 0.991 | Not Significant |

Note: *, **, *** indicate a significant relation at 10%, 5%, 1%; SD= Standard Deviation; LE= Leadership Experience.

## DISCUSSION

The results of this study indicated that principals demonstrated a high level of principal technology leadership practices for all five dimensions. This finding was in line with Alkrdem (2014) and Leong (2017) who found that the principals in Negeri Sembilan demonstrated a high mean score for all the ISTE Standards•A (2009) dimensions. This result indicates that Palestinian principals discovered their role as technology leaders, and they are capable of playing a technology leadership role in their schools.

The positive significant relationship which was found in this study between the five constructs of technology leadership (systemic improvement, visionary leadership, excellence in professional practice, digital age learning culture, and digital citizenship) and professional development with teacher's technology integration in the Palestinian public schools in the west bank is supported by Thannimalai & Raman (2018) result who found that Principals' Technology Leadership is a good predictor for Teachers' Technology Integration. Also, this inline with Fisher and Waller (2013) result who proved that there is a correlation between Principals' Technology Leadership and Teachers' Technology Integration in the classroom. This result is also consistent with Grey-Bowen (2010) and Raman & Thannimalai (2019) who proved that for all constructs of NETS-A significant professional development needed and it is the deciding factor to facilitate technology integration in the classroom .

This study also found that gender is moderate variable just between digital age learning culture and teacher's technology integration this in line with Mohd et al. (2010). As for the other construct the study shows that gender is not a moderating factor in the relationship between visionary leadership, excellence in professional practice, systemic improvements, digital citizenship and teachers' technology integration and this finding is supported by Alkrdem (2014) and Leong et al. (2016) which means that gender does not influence technology leadership and that what some recent research studies reveal

that the gap between men and women is shrinking or does no longer exist (Papaioannou, & Charalambous, 2011) . This contradicts what (Hung & Hsu, 2007; Jamieson-Proctor et al., 2005; Seyal, 2012) reported that the male teachers showed higher technology integration and usage than the female teachers. This study found that both male and female principals are able to carry out the NETS-A (2014) standards for technology leaders.

As for principal's experience as moderator it was found that principal experience does not have a moderating effect between all five constructs of technology leadership and technology integration. This result is consistent with Seyal (2012) that experience as school leaders and educational level has no significant effect on principals' ICT usage and Kusano et al. (2013) who considered teaching experience was not a significant predictor of U.S. teachers' attitude towards technology integration. But this result contradicts Inan & Lowther (2010) who found that teaching experience, had a significant total impact on technology integration.

## CONCLUSION

Although this study found that there is a positive significant relationship between the five constructs of technology leadership and professional development with teacher's technology integration in the Palestinian public schools on the west bank. But the professional development construct was at a low level so more effective continuous professional development, especially on ICT, should be provided to school leaders. The training provided to school leaders by the ministry of education mainly Teacher and Leadership Development Program (LTD) funded by the United States Agency for International Development (USAID) which started in 2013 and other programs should be redesigned to raise the principal's ICT competency. This training should focus on the use of technology by teachers in the classroom to create learning and teaching experiences. There is also a need for more effective technology leadership training programs and ICT training programs for school principals.

This study was only carried out in the west bank of Palestine, further research must be done in the west bank and Gaza strip. As this was a quantitative study, it is suggested that future researchers design a mixed-method approach or using dyadic analysis using qualitative data for an in-depth study not only to study the effect of gender, experience, and professional development on the relationship between technology leadership and technology integration but also try to study the relationship between principal's technology leadership and teacher's technology integration and the effect of professional development as a moderator and not as an independent construct.

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