Digital Leadership Among School Leaders in Malaysia

Mat Rahimi Yusof, Mohd Faiz Mohd Yaakob, Mohd Yusri Ibrahim

Abstract: *In line with the rapid development of IR 4.0, school leaders need to seize the opportunity to transform them by integrating technology in leadership style. Hence, this study is aimed at developing a measurement model and identifying the functions and behaviors of the digital leadership of the school leaders. Using the SEM AMOS analysis, a questionnaire collected from 352 primary and secondary school principals. The confirmatory factor analysis (CFA) was carried out in ascertaining the proposed factor. The finding succeeded in developing a digital leadership measurement model. The findings also identified two dimension, nine functions and 42 behaviors practiced by principals in digital leadership practice. These two dimensions are communication and school climate, while nine functions include virtual meetings, virtual discussions, virtual information sharing, online file sharing, virtual communication, virtual teaching and learning supervision, virtual monitoring of students' performance, virtual promotion of development and professionalism and virtual promotion of school's goals.*

Index Terms: **School leadership, Digital leadership, Virtual communication,**

I. INTRODUCTION

Recently, digital technology has come true in society[1] and has brought a new phenomenon in communication practices. The new medium of virtual communication began to gain a place in society [2]. Communication applications such as WhatsApp, telegram and twitter are among the popular apps [3].

This global phenomenon also challenges the leadership style of school leaders. In this case, school leaders need to be futuristic in mind if they want to compete in a competitive world of education. Futuristic-minded leaders should dare to anticipate the technological capabilities that evolve each day in improving leadership practices at school.

This global phenomenon has also led to the introduction of several new terms by scholars including remote leadership, digital leadership, virtual leadership and e-leadership [4], [5]. In addition, this global phenomenon also affects the leadership landscape of school leaders. The new medium of virtual communications such as WhatsApp and telegram has gained place among school leaders [6].

School-headed leaders need to be alert and dare to bring changes in leadership practices by supporting the use of technologies that can create a conducive digital environment for teachers and students, to enhance the knowledge, skills, and the mastery of digital technologies of the internet and the new medium of virtual communication.

II. BACKGROUND

Leadership is the most important element in school [7]. Entering the IR 4.0 era of evolution that takes place in global leadership should be taken seriously by school leaders. In general, literature studies show that evolution in leadership is included in the leadership of education as a result of rapid development in the field of Advanced Information Technology such as internet email, video conferencing, groupware system (GSS) in the late 1990s [8]. This evolution also influences the leadership practices of school leaders [9].

This evolution requires school leaders to take proactive steps in applying technology while preparing for technology-related knowledge and information [10]. However, in the context of Malaysian education leaders, literature studies show that many school leaders have low [11] and medium [12] levels of knowledge and skills in technology leadership.

Therefore, school leaders need to explore and master new knowledge and skills as well as be aware of the latest technology changes. As technology leaders in schools, principals must first master and be competent with technology [6]. Not only that, the principals also need to master the knowledge and skills of other digital technologies such as interactive whiteboards (IWBs), documents camera, chrome book, cloud computing dan 3D contents.

In the international scene, literature shows the evolution that takes place in digital leadership not only in the leadership of the school, but also involves other sectors and businesses [13]. In New York, for instance, most school leaders use the iPad to supervise teachers through programs that are synonymous with Bring Your Own Device (BYOD) or Bring Your Own Technology (BYOT)[5].

The impact of evolution in the leadership and development of digital leadership, the western scholars have set seven milestones of digital leadership namely communication, public relations, branding, professional development and enhancement, student learning involvement, opportunities, environments and learning space [14]–[16].

This evolution also affects the definition of digital leadership. Many of the definitions provided by researchers include creating links, influencing others, initiating sustainable change through access to information, and establishing relationships in an effort to expect significant changes to

future school success [17] or a combination of dynamic thinking, behavior , and the skills to transform and improve school culture through the use of technology [5].

In the context of this study, digital leadership is defined as the integration of digital technologies such as mobile devices, communication applications, and web applications in leadership practices of school leaders towards a sustainable change in the use of technology at schools. In short, digital leadership is a combination of leaders, resources, hardware and technology.

Based on this definition, the concept of digital leadership is wider. It is not just about the use of computers or mobile technology in carrying out leadership functions but also providing extensive digital networks such as online forums, wikis, blogs, online file sharing and video conferencing towards enhancing leadership and teaching and learning practices[18].

Given the importance of the IR 4.0 environment, researchers have suggested that school leaders integrate digital technology in leadership practices [4], [9], [19] - [23]. However, there is relatively no digital leadership model specifically developed in the context of the Malaysian education leadership environment.

Hence this initial study is aimed at developing the digital leadership measurement model of school leaders by identifying the dimensions, functions and behaviors of the digital leadership of Malaysian school leaders as in the following Figure 1:
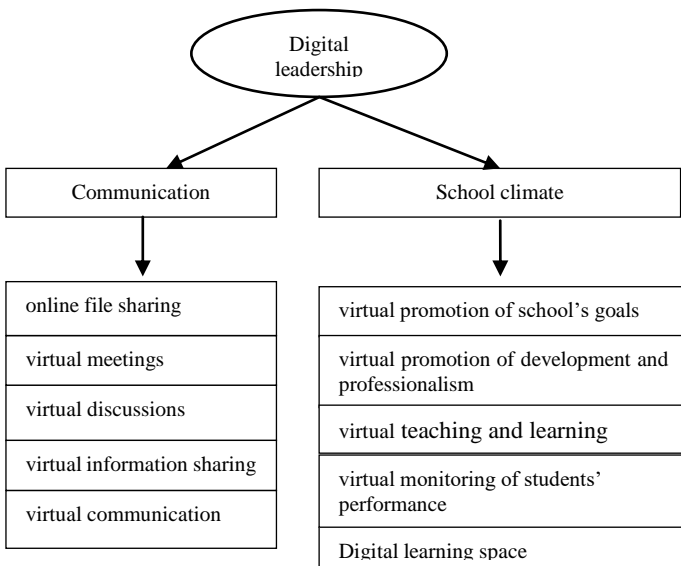

Figure 1. hypothesis model

Based on figure 1, the researcher proposes two dimensions which are communication and school climate and several functions that can be applied in digital leadership practices at school. These functions are virtual meetings, virtual discussions, virtual information sharing, online file sharing, virtual communication, virtual teaching and learning supervision, virtual monitoring of students' performance, digital learning space, virtual promotion of development and professionalism; and virtual promotion of school's goals.

III. METHOD

Design
This quantitative study uses a cross-sectional survey design. This research design is chosen because of the ability to investigate almost all problems and questions, efficiently and save time and money and data can be directly collected from the research sample to obtain the study variables information [19], [20].

Respondents
The respondents of this study consisted of 352 school principals in Malaysia comprising principals and headmasters in secondary and primary schools under the Ministry of Education. Survey data were collected from 352 respondents consisting of 110 men and the rest were women. Among the respondents, 1.4% or 5 participants were Ph.D holders, 13.2% or 47 respondents with a bachelor's degree and the rest graduated with a bachelor's degree and diploma in education.

Measures
The data were collected using a five-point scale questionnaire distributed online to 352 principals and headmasters. The data were analyzed using structural equation model (SEM) with the help of AMOS 2.0 software. Confirmatory factor analysis (CFA) was carried out in ascertaining the proposed factor. Four main elements were given attention namely factor loading, convergent validity, composite reliability and discriminant validity.

Items, constructs and model variables are acceptable when the regression coefficient (β) for the standard load is at least 0.708, the average variance extracted value (AVE) for the convergence of 0.5 and above, the composite reliability (CR) value for reliability 0.708 and above, and the AVE square root value is greater than the correlation values between the items or between the constructs of the legality of discrimination [21], [22]. Although the coefficient value is 0.708 and above, the regression coefficient of the item exceeding 0.4 is still acceptable if the AVE value is reached, which is more than 0.5 [21].

IV. RESULTS

Generally, the findings show that digital leadership variables are in normal distribution and mutually dependent. Table 1 shows the matrix for descriptive information, the correlation normality between variables.

Table 1. Descriptive, normality and correlation (AVE values are shown diagonally)

	Skew	Kurt	1	2	3	4	5	6	7	8	9	10
1. MM	-0.88	0.54	**0.59**									
2. KF	-0.44	-0.3	0.39	**0.64**								
3. KM	-1.38	2.59	0.38	0.63	**0.75**							
4.PKM	-0.61	0.11	0.35	0.60	0.58	**0.54**						
5. PS	0.04	-0.9	0.22	0.37	0.36	0.34	**0.52**					
6. PPP	-1.08	1.64	0.36	0.61	0.59	0.56	0.35	**0.73**				
7. RP	-0.28	0.21	0.37	0.63	0.61	0.57	0.36	0.59	**0.32**			
8.KMB	-0.9	0.57	0.36	0.61	0.59	0.56	0.34	0.57	0.58	**0.59**		
9. DM	-0.88	0.55	0.34	0.57	0.55	0.52	0.32	0.53	0.55	0.53	**0.73**	
10.MMP	0.16	-0.7	0.29	0.49	0.47	0.44	0.28	0.46	0.47	0.45	0.42	**0.52**

Consequently, in order to validate the constructs and indicators proposed in the digital leadership model, factor validation analysis was done as shown in Figure 2. Overall, the 48 proposed indicators obtained a factor loading more than 0.4 which is acceptable and all functions showed the standard load value, AVE and CR required in measuring the function of the digital leadership of school leaders.

The following Table 2 presents the factor loading, convergence validity, composite validity and discriminant validity of digital leadership functions. This finding means all 48 indicators were acceptable as measurement indicators for the constructs in digital leadership.
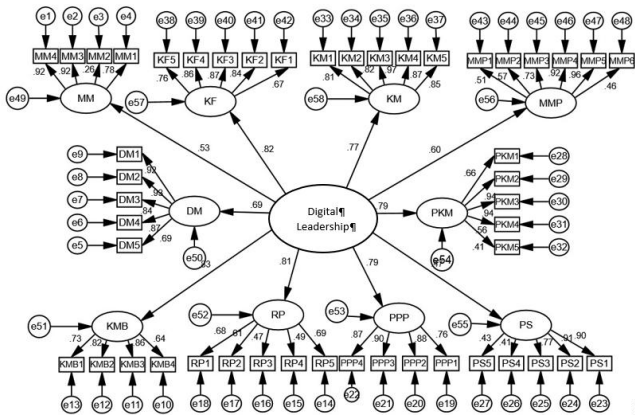

Figure 2: The initial measurement model of digital leadership

However, for the MM2 indicator that is giving teachers the opportunity to come together in decision-making in virtual messaging obtained a low factor loading value (FL=0.263). Therefore, this indicator (MM2) was extracted because it was unable to measure the construct. This finding means this behavior is unacceptable. After the MM2 indicator dropped the value of AVE and CR increased (AVE=0.770, CR=0.909).

Table 2. Standard factor loading, convergence validity, composite reliability and discriminant validity

Constructs	FL	AVR	CR	√AVE
Virtual meetings	0.263 - 0.925	0.594	0.84	0.771
Virtual discussions	0.690 - 0.934	0.733	0.93	0.856
Virtual information sharing	0.639 - 0.860	0.589	0.85	0.767
Digital learning space	0.465 - 0.687	-0.322	0.65	0.567
Virtual promotion of development and profesionalisme	0.758 - 0.903	0.728	0.91	0.853
Virtual communication	0.813 - 0.967	0.747	0.94	0.864
Online file sharing	0.666 -0.873	0.643	0.9	0.802
Virtual teaching and learning supervision	0.457 - 0.964	0.519	0.86	0.72
Virtual monitoring of students performance	0.408 - 0.844	0.539	0.84	0.734
Virtual promotion of school's goals	0.412 - 0.912	0.518	0.82	720

As for the convergence validity, nine AVE constructs obtained a value greater than the specified constructs validity value. However, for digital learning space constructs, the convergence value (AVE) did not achieve a minimum value set at 0.5. The AVE value for digital learning space constructs was 0.322. After removing RP3 and RP4 indicator items the AVE, CR and √AVE values increased (AVE=0.434,

CR=0.69, √AVE=0.835). Although there was an increase, the AVE value still did not reach the desired value. Thus, this construct was removed from the digital leadership model for school leaders. The findings of this early study meant that digital learning space has not been accepted in the practice of digital leadership for school leaders. Table 3 illustrates the indicators for digital learning space constructs.

Table 3. Indicator items for digital learning space construct

	Indicators	FL
RP1	Provide conducive learning space for student	0.68
RP2	Ensure internet connection can be accessed in the classroom	0.61
RP3	Provide equipment such as LCD, smart board in classroom	0.47
RP4	Encourage teachers to access online learning material to share with students in the classroom	0.49
RP5	Encourage students to access online learning material to share in the classroom	0.69

Consequently, the constructs in digital leadership were further verified by observing the value for the square root of AVE which was compared to the correlation values as shown in Table 4.

Table 3. Summary of correlation value between constructs (values that are bold are √ AVE values)

	MMP	KF	KM	PKM	PS	PPP	KMB	DM	MM
MMP	**0.720**								
KF	0.513	**0.802**							
KM	0.458	0.623	**0.864**						
MKM	0.470	0.639	0.571	**0.734**					
PS	0.290	0.395	0.353	0.362	**0.853**				
PPP	0.463	0.629	0.562	0.576	0.356	**0.853**			
KMB	0.520	0.706	0.631	0.647	0.400	0.638	**0.767**		
DM	0.436	0.593	0.530	0.543	0.336	0.535	0.601	**0.856**	
MM	0.348	0.473	0.423	0.433	0.268	0.427	0.479	0.402	**0.771**

The findings show that the values for the square root of AVE were larger than the correlation values between the constructs. Thus, it can be concluded that the validity of the nine proposed constructs of digital leadership for school leaders is acceptable, while one construct is unacceptable to measure the digital leadership variable for school leaders. Finally, a digital leadership measurement model of a school leader was successfully developed and validated with nine constructs and 42 indicator items representing the behavior of the digital leadership for school leaders as shown in Figure 3.

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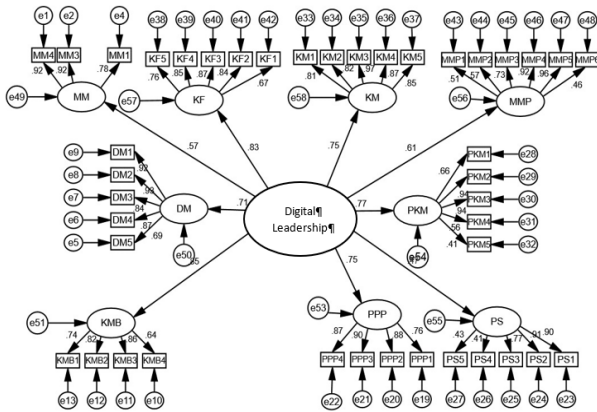# Digital Leadership Among School Leaders in Malaysia

Figure 3.
Figure 3. Final Digital leadership measurement model

The following table shows the indicators or behaviors accepted in digital leadership for school leaders in Malaysia.

Figure 4. CFA analysis for digital leadership model

Constructs	Suggested behavior	Rejected behaviour	Accepted behavior
Virtual Meetings	4	1	3
Virtual discussions	5	0	5
Virtual Sharing Information	4	0	4
Digital Learning Space	5	5	0
Virtual Promotion of Development and Profesionalisme	4	0	4
Virtual Comunication	5	0	5
Online File Sharing	5	0	5
Virtual teaching and Learning Supervision	6	0	6
Virtual Monitoring of Students Performance	5	0	5
Virtual Promotion of School Goals	5	0	5
Total	48	6	42

V. DISCUSSION

A study conducted on 352 respondents has successfully developed a digital leader leadership measurement model. The results of factor validation analysis, two dimensions and nine constructs of the proposed 10 constructs and 42 behaviors of the digital leadership of the school leaders have been identified. The constructs are i. virtual meetings, ii. virtual discussions, iii. virtual information sharing, iv. online file sharing, v. virtual communication, vi. virtual teaching and learning supervision, vii. virtual monitoring of students' performance, vii. virtual promotion of development and profesionalisme and ix. virtual promotion of school goals. In this initial study, the digital learning space constructs were taken out because the statistical value obtained, as previously discussed, did not reach the minimum set. In other words, this function is not yet fully acceptable in digital leadership for school leaders. However, this finding does not mean principals and headmasters ignore this function in their leadership. This is likely due to the fact that school leaders

have not fully implemented the function of empowering digital learning space in schools. Given that digital learning space is important in 21st century learning. It is hoped that interested future researchers will test this function by improving the indicators in this initial study so that the second validation can be done.

Next, in the context of research, it is proposed to future researchers to further enhance the study by improving the model development. The model developed at this initial stage could be the basis for future researchers to test and modify the dimensions, constructs and indicators of the proposed indicators in the digital leadership for school leaders.

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