Principal Change Facilitator Styles and The Effect on Teacher Technology Integration in School: A Literature Review

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Abstract

This literature review is based on Change Facilitator Style (CFS) model which is aimed at identifying leadership styles among school principals as change facilitators and also Technology Integration Matrix (TIM) model framework to identify the level of technology integration within the features of a technology-integrated learning environment. This study examines the role of principals as facilitators of change based on three categories, namely principals as Initiators, Managers, and Responders through assessment in three dimensions, namely the dimension of concern for others, organizational efficiency, and strategic sense. While the aspect of technology integration in the classroom is analyzed based on the level of technology integration according to five stages of implementation, namely entry-level, adoption level, adaptation level, infusion level, and transformation level. In addition, the five characteristics of the learning environment based on the integration of technology, namely active learning, collaborative learning, constructive learning, authentic learning, and also goal-directed learning are also discussed in terms of teacher practices. Next, previous studies on the relationship and contribution of principal change facilitator style towards the level of technology integration are also discussed. Finally, a conceptual framework for studying the influence of principal change facilitator style on the level of teacher technology integration in the classroom has been developed for further study and exploration.

Keywords: Principal, Teacher, Change Facilitator Style, Technology Integration Matrix, School

Introduction

Over the past few decades, the element of leadership among school leaders has become a major topic frequently discussed in the field of education (Hall & George, 1999; Hall & Hord, 2014; Hougen, 1984; Schiller, 1991). Most studies involving school leaders are more likely to look at the relationship between principal leadership and student achievement (Andrews & Soder, 1987; Hall, Negroni & George, 2013; Hallinger, Bickman & Davis, 1996; Witziers, Bosker & Kruger, 2003). While some studies aimed at identifying or classifying leadership styles demonstrated by school leaders (Hall et al., 1984; Hall & George, 1999; Ibrahim & Al-Taneiji, 2012). In this regard, Hall and George (1999) explain the importance of principal's role in establishing school climate, just as the teacher establishes the climate for the classroom. Accordingly, the scenario of the relationship between the principal leadership style and the

school climate is undeniable because it is a major topic that has been explored in previous literature studies. The advent of the information and communication technology (ICT) era has further emphasized the importance of the role of school leaders in integrating innovations in the field of education into the classroom in their respective schools (Garland & Tadeja, 2013).

The fifth shift in the Malaysian Education Blueprint (MEB) 2013-2025 aims to ensure that all schools are managed and administered by high performing school leaders (Ministry of Education Malaysia, 2013). In this regard, the relevance of this study is based on MEB 2013-2025 which has been developed by the Ministry of Education Malaysia (MoE) as the main blueprint in sketching the vision of the education system and the aspirations of students in meeting the needs of the country in the future. The blueprint consists of 11 strategic and operational shifts that need to be implemented by the MoE to achieve the desired vision (Ministry of Education Malaysia, 2013). The fifth shift refers to "ensuring high-performing leadership is placed in every school" that is, the impact of its implementation in producing excellent instructional leaders as well as agents of change. While the seventh shift is about "utilizing information and communication technology (ICT) to improve the quality of learning in Malaysia". The impact which is hoped to achieved is that ICT will be able to help strengthen the teaching and learning process in over 10,000 schools.

In this regard, with the continuation of the second wave of the MEB 2013-2025, the MoE continues to actively improve the system by implementing changes in the national education system to accelerate the pace of change that has started in the first wave of the MEB. In this regard, to drive change of the aspirations of the education system in Malaysia, various initiatives have been planned and implemented. Among them were quality aspiration that is the initiative to empower the quality of school leaders and also in the efficiency aspiration that is the initiative to increase the use of technology in teaching and learning (Ministry of Education Malaysia, 2018).

Research Problem
A review of the literature found that studies on the influence of change management on the integration of technology are still poor (Larosiliere, McHaney & Kobelsky, 2016; Liu, Ritzhaupt & Cavanaugh, 2013). In addition, there are issues and problems cropped up among school leaders related to the field of school management and leadership as it was found that school leaders still need continuous assistance in their efforts to succeed in their respective schools (Ahmad Rafee et al., 2014; Quah & Azmiza, 2013). Furthermore, the development of digital education today requires educational leaders to be vigilant towards the changes that occur in their environment. However, the failure of educational leaders to be attentive towards the current education needs leads to various challenges in leading and managing change effectively (Burke, 2011; Burnes, 2014; Kotter, 2011; Kotter & Rathgeber, 2014; Shariffah & Kamaruzaman, 2013).

Past studies have found that the majority of organizational change initiatives as a whole, have failed (Beer & Nohria, 2011; Burke, 2011; Judge & Terrel, 2013; McKinsey & Company, 2008). Although technology today has changed the operational mode of various sectors in the economic sector globally, the impact of technology on education sector, especially in relation to school change, however, is still unclear (Hess, 2009; MoE, 2013; Larosiliere, McHaney & Kobelsky, 2016). This is further strengthened by the findings of studies which suggest that technology is not fully utilized to change the teaching and learning activities because technology is considered as a mere tool to support existing practices (Bailey et al., 2011; Ehrlich, Sporte & Sebring, 2013).

Based on literature review, it was also found that there is still a lack of research conducted focusing on developing framework on school leadership development in terms of technology management towards effective technology integration (Ahmad Zabidi, Abdul Rahman & Nagarajan, 2015; Jainabee et al., 2011; Larosiliere, McHaney & Kobelsky, 2016; Richardson et al., 2012). Although studies related to leadership, management, and technology in the field of education show an increase in the number of studies in some countries, however, the statistic is relatively low (Hallinger & Chen, 2014; Liu, Ritzhaupt & Cavanaugh, 2013). As such, the study on educational leadership and management practices of school leaders, especially in Malaysia, must be conducted continuously. It is an important process towards contributing to the body of knowledge on various aspects of management that can be applied by school leaders.

Principal Influence
Schools are social institutions that provide education to children of a local community. In this regard, the quality of teachers and principal leadership is the key to the development of school (Hall, Negroni & George, 2013). Experts in the field of education, researchers, policymakers, and parents have long agreed that teachers play an important role in influencing student learning. Similarly, there is an increase in awareness of the role and influence of principals towards teachers which eventually affect students as a whole. There were studies carried out in relation to what is required by principals in performing and carrying the role as a school leader which includes aspects such as guidance, professional development, and support (Daresh, 2001). Scholars such as Marks and Nance (2007) have explored the main influence of principals on teacher practices and supervision, while Reeves (2007) has explored the relationship between principals and school culture. Leithwood, Patten, and Jantzi (2010) have conducted a series of ongoing studies on the influence of principals including exploring its impact on student learning.

According to Michael Fullan (2001), it has been concluded that the time taken to convert a low-performing school or district to better performance is between 3 to 8 years. However, his study in 2007 found that through the increase in knowledge in terms of change, the time can be reduced by half that is around 2 to 4 years (Fullan, 2007). This shows that increasing the ability of school leaders in terms of change management can contribute to the positive development of a school to a better level.

Besides, the globalization of education and technology today has also changed the learning atmosphere and environment. Students' existing knowledge and how they learn in this digital era is a new environment and therefore is important for school leaders to understand (Papa, 2011). In this regard, school leaders need to stimulate and support the use of technology in the digital world which is no stranger to today's school children. This will certainly give new challenges to school leadership. Noraini, Hamidon and Mohd Izham (2015) explain that school leaders face challenges in performing their role as leaders which require them to manage technology in terms of infrastructure development, asset management and maintenance, provision of appropriate learning and teaching software, teacher mastery in technology integration in the classroom, training of information and communication technology (ICT) skills to teachers and cultivating ICT community among teachers, students, and school administration.

Change Management

Implementing change does not mean eliminating all problems that exist in school but it is meant for planning for change in a more innovative way taking into account the pressures of change from within or outside the organization (Hargreaves et al., 2011). Change management according to Hiatt and Creasey (2012) refers to a field of discipline that guides an organization to prepare, provide necessities for change, and provide support to individuals so that changes can be implemented successfully so that changes made can drive the success of an organization to achieve the desired results (Hayes, 2018). Change management in schools according to Park and Jeung (2013) is about the process of individual and organizational change which involves the process of enhancing enthusiasm, affective, and intellectual factors to change from existing state to the better.

Every school leader is responsible for improving student achievement, implementing continuous improvement, and managing the changes that will be made effectively to cope with current development. Accordingly, the level of principal leadership plays a very important role in the process of planning, implementing, and monitoring every aspect of change (Fullan, 2013; Hargreaves et al., 2011). Izham and Hussein (2009) explained that change has a great magnitude for educational leaders who face various challenges and current demands. It is in line with the development of education agenda which prides a form of encouragement for education leaders to face the increasing pressure of change.

The challenge for school leaders today is to develop the ability to manage and lead change in the field of education. This is due to the rapid growth of digital environment that needs to be optimized both by teachers and students in schools. According to Fullan (2010), school leaders are individuals who are responsible as change managers and are at the core of leading change in schools. As school-level managers, school leaders are the most important individuals who can influence school success (Hallinger & Lee, 2013). In essence, the changes made are aimed at improving the education system at all levels and the success is closely related to organizational leadership capabilities (Ghitulescu, 2013). Fullan (2010) also states that change is a complex process. Therefore, an educational leader needs to have the ability in terms of awareness, knowledge, and leadership skills to cope with the pressures of change. In this case, education leaders who lacked the awareness, knowledge, and skills in leading change will not be able to bring about change in the organization they lead. Therefore, education leaders must be sensitive to every development that occurs and be prepared to face change.

Technology Integration

School leaders play a very important role in the integration of technology in schools. They need to ensure the mission of leading and managing the school also includes aspects of planning and implementation of new strategies to help teachers and students to recognize, understand and so on integrating technology in learning and teaching activities in the classroom (Levin & Schrum, 2015). In this regard, school leaders need to have a good understanding in pioneering the changes of the digital era today because new technologies are constantly emerging and at the same time school leaders need to provide different approaches in terms of technology integration and further promote the development of a more systematic education system (Garland & Tadeja, 2013).

In a situation where schools continue to make acquisitions or expenses to buy equipment and technology resources for teaching and learning purposes every year, it should also be emphasized that the need for school leaders and teachers to be equipped with skills

in utilizing these technologies to support student learning nowadays. Accordingly, various organizations, agencies, experts, and academics have agreed on the importance of providing students with 21st-century skills (International Society for Technology in Education, 2016; Partnership for 21st Century Skills, 2011; Saavedra & Opfer, 2012; United States Department of Education, 2014). The skills include critical thinking and problem solving, communication, collaboration as well as creativity and innovation (National Education Association, 2008). These 21st-century skills can be taught and learned by students more effectively through effective technology integration (Brantley-Dias & Ertmer, 2013; Saavedra & Opfer, 2012).

Technology integration has been briefly defined by Technology in School Task Force (2002) as an effort to integrate technology equipment and resources with technology-based practices or activities into daily routines, assignments, and school management. Some researchers explain that the level of integration of technology has now changed from learning about technology, to learning from technology, to learning with technology (Ertmer & Ottenbreit-Leftwich, 2013; Saavedra & Opfer, 2012). In this case, the technology integration model that emphasizes the need for the use of technology alone needs to be changed to a model focused on the pedagogy that technology enables and supports, rather than on the technology itself (Ertmer & Ottenbreit-Leftwich, 2013). This change in the concept of technology integration has been translated by Davies and West (2014) as the effective implementation of educational technology to achieve the expected learning outcomes. Accordingly, based on the development of the definition of technology integration, a clearer and deeper understanding of the technology integration process will be gained by school leaders and teachers through the exploration of a more complex and comprehensive technology integration model.

Theoretical Framework of the Study
The main theory underlying this study is Open System Theory (Hoy & Miskel, 2013). Hoy and Miskel (2013) explain that educational organizations such as schools, colleges and universities are a system that has a relationship of social interaction. In these organizations there is a group of individuals who contribute energy (human resources) and work together towards achieving the same goal while at the same time responding or interacting with the changes taking place in the environment. In this regard, schools are also identified as a goal-oriented social system (Bush & Middleton, 2013). Based on the Open System Theory, the theoretical framework of this study has been constructed as Figure 1.

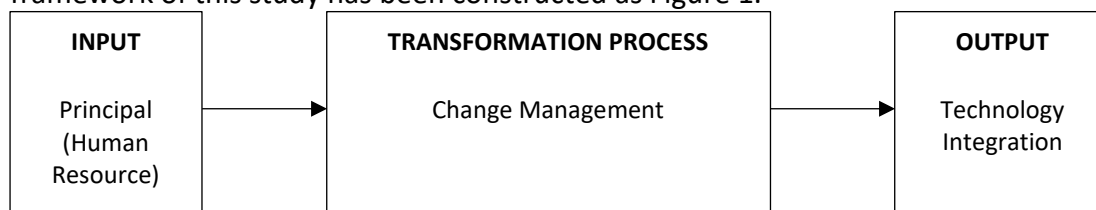| **INPUT**	**TRANSFORMATION PROCESS**	**OUTPUT**
Principal (Human Resource)	Change Management	Technology Integration

Figure 1   Theoretical framework of the study
Source: Adapted from Open System Theory (Hoy & Miskel, 2013)

In addition to the theory, two models are also used in underlying this study, namely Change Facilitator Style (Hall & George, 1999; Hall & Hord, 2014) and the Technology Integration Matrix (TIM) by the Florida Center for Instructional Technology (2019). Overall, the framework of this study is a combination of all theories and models to produce a goal that is towards increasing the level of integration of technology in schools. However, in this study, the practice of change management and technology management among school principals

may be influenced by various factors including location, duration of experience working as a school leader and the number of technology-related courses attended. Accordingly, the conceptual framework of the study is illustrated in Figure 2.

Change Management
(Hall & George, 1999; Hall & Hord 2014)

♣ Concern for people
♣ Organizational efficiency
♣ Strategic sense

Demographics
♣ School location
♣ Administration Experience
♣ Training received

Technology Integration
(Florida Center for Instructional Technology, 2019)

Level of technology integration based on the characteristics of the learning environment:

♣ Active learning
♣ Collaborative learning
♣ Constructive learning
♣ Authentic learning
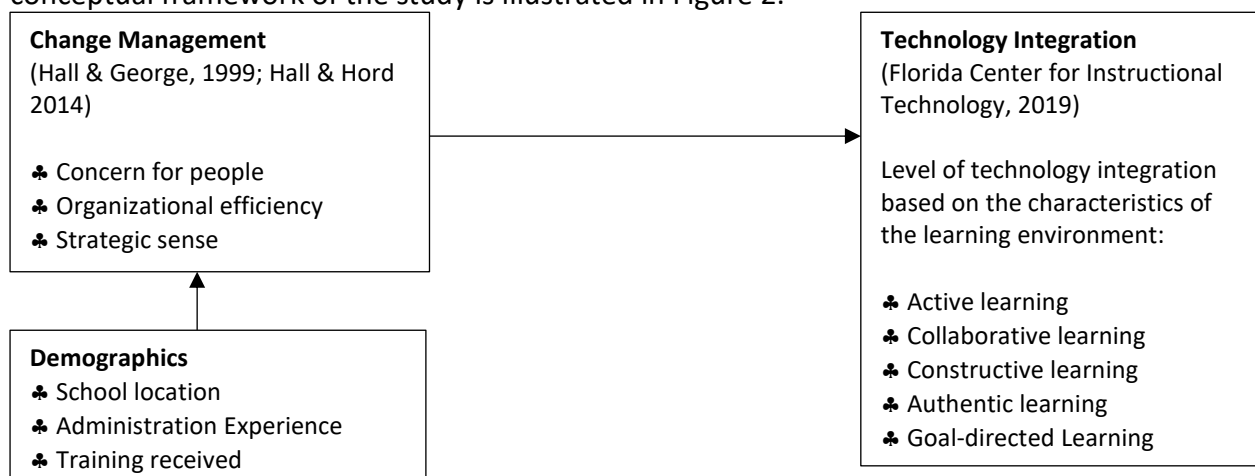♣ Goal-directed Learning

Figure 2 Conceptual framework of the study
Source: Adapted from a combination of Open System Theory (Hoy & Miskel, 2013), the Change Facilitator Style model (Hall & George, 1999; Hall & Hord, 2014), and the Technology Integration Matrix framework model (Florida Center for Instructional Technology, 2019).

Change Facilitator Style (CFS)

The Change Facilitator Style Model (CFS) aims to study the elements of change management among school leaders (Hall & Hord, 2014). According to Liu, Ritzhaupt, and Cavanaugh (2013), the pre-requisite for the implementation of an effective technology integration program in schools is through the professional development of teachers in the early stages of the program and continuous throughout the integration implementation process. In this regard, the development of professionalism is influenced by school leaders, i.e. school leaders play a role in promoting the process of professional development by supporting the production of creative ideas, fostering and ensuring implementation practices at an early stage, providing the resources needed for the development of new ideas, encouraging new approaches and reflections on the implementation process.

To encourage more research to be conducted in the field of technology integration in schools, a reliable and valid instrument is needed to measure the leadership level of school leaders (Liu, Ritzhaupt & Cavanaugh, 2013). The theoretical framework presented by Hall and Hord (2014) in the CFS model aims to explain the basic dimensions that differentiate facilitator styles from change. The CFS model contains 3 main dimensions of the cluster, namely concern for others, organizational efficiency, and change strategies. Each cluster contains two interconnected bipolar dimensions making a total of six dimensions that need to be measured in determining the facilitator's style of these changes as shown in Table 1.

Table 1
Clusters And Dimensions In Change Facilitator Style Theory

Cluster	Dimension
Concern for people	(Social / informal)
	(Formal/meaningful)
Organizational efficiency	(Trust in others)
	(Administrative efficiency)
Strategic sense	(Day-to-day)
	(Vision and planning)

Source: Adapted from Hall and Hord (2014)

The CFS construct has emerged and developed over the past three decades. A study to identify principal style differences at an early stage was conducted through a three-year study on the implementation of new science subject programs in sub-urban schools in the United States (Hall, Hord & Griffin, 1980). The study focused on measuring the level of concern in teachers' Stages of Concern, Level of Use and Innovation Configurations (Hall & Hord, 2014). In the study, although more than 50 schools had received the source of curriculum materials through the same workshop, the level of program implementation between one school to another school differed. Accordingly, the study of Hall, Hord, and Griffin (1980) had classified the level of program implementation progress for each school studied into 3 groups. Furthermore, through the process of discussion and consultation with the district education office, a hypothesis had been developed to explain the differences in the level of program implementation between schools, namely the extent to which the implementation of new programs was related to how the principal of each school plays a role as the facilitator of change.

In the study, Hall, Hord, and Griffin (1980) found that the principals in the first group had actively acted to determine the outcome of the program implementation and had provided support and encouragement to all teachers to implement the new curriculum. The principals in the second group were seen to be more focused on managing the resource requirements of curriculum materials and planning the teaching time of Science subjects. While the principals in the third group were seen to put full trust in the teachers which they believe to know what to do and only provided them with little direct support or monitoring. This analysis of Hall, Hord, and Griffin (1980) study further suggested three styles of Change Facilitator or CFS namely Initiators, Managers, and Responders. A brief definition for each CFS is illustrated in Table 2.

Table 2
Change Facilitator Styles (CFS)

Facilitator Style	Definition
Initiators	Have a clear vision in prioritizing long-term policies and goals to be achieved but at the same time implement current innovations. Have a clear understanding of what is meant by the good school and teaching and work hard to achieve this vision
Managers	Emphasize organizational management as well as budget and resource control by ensuring that organizational rules, procedures, and policies are implemented in the right way. They demonstrate responsive behavior to an ongoing situation or individual action in the organization and mobilize support for change efforts.
Responders	More emphasis on the perception of the individual that is always taking into account the feelings and concerns of staff in his organization in acting. They relinquish their responsibility to lead change efforts to teachers and other subordinate staff and believe that their primary role is to ensure the school runs smoothly by being friendly and liked by teachers and staff.

Source: Adapted from Hall and Hord (2014)

Technology Integration Matrix (TIM)
Technology Integration Matrix (TIM) had been created as a comprehensive framework for assessing technology integration in teaching environments (Harmes, Welsh & Winkelman, 2016; Welsh, Harmes & Winkelman, 2011). According to Welsh, Harmes, and Winkelman (2011), TIM encompasses resources that exemplify best practices, present planning contexts, and provide assistance in the selection of teacher professional development. TIM was created in 2006 by Florida Department of Education together with Florida Center for Instructional Technology, based at the University of South Florida's College of Education. To replace the 2011 version of TIM, the latest version of TIM which was officially launched in 2019 has been further expanded by providing more information related to the focus on teachers, students and components of the learning environment. Although TIM was created to meet the needs of educators in Florida, it is also suitable being used as a technology integration guideline regardless of the location where the school is located (Welsh, Harmes & Winkelman 2011).

As shown in Table 3, TIM provides an overview of how teachers can use technology to enhance student learning by describing five characteristics of the learning environment to produce a meaningful learning environment, collaborative learning, constructive learning, authentic learning and goal-directed learning.

Table 3
Characteristics of the learning environment in TIM.

Characteristics of the learning environment	Description
Active learning	Pupils are actively involved in using technology as a learning tool and not passively (merely receiving information from technology)
Collaborative learning	Pupils use technological equipment to work with other students rather than working individually at all times.
Constructive learning	Pupils use technological equipment to connect new information with existing knowledge rather than simply passively receiving information.
Authentic learning	Pupils use technological equipment to connect learning activities with the real atmosphere outside the classroom rather than just carrying out internal tasks.
Goal-directed learning	Pupils use technological equipment to set goals, plan activities, monitor progress, and evaluate results rather than just completing assignments without reflection.

Source: Adapted from Florida Center for Instructional Technology (2019).

Each of these features is combined with five levels of technology integration as shown in Table 4, namely entry-level, adoption level, adaptation level, infusion level, and transformation level. The combination of the five levels of technology integration and the five characteristics of this meaningful learning environment ultimately produces 25 cells (5 levels x 5 features) of the technology integration matrix that serves as a guide which can be practiced in a learning environment. All these matrices are also used as a basic guide for schools to carry out professional development related to technology and as a general vocabulary on the integration of technology.

Table 4
Levels of technology integration in TIM.

Level of Technology Integration	Description
Entry Level	Teachers begin to use technological equipment to deliver teaching content to students.
Adoption Level	Teachers instruct students to use technological equipment based on instructions and conventionally.
Adaptation Level	Teachers help students to explore and use technological equipment on their own.
Infusion Level	Teachers provide learning contexts and students select appropriate technological equipment to use to obtain results.
Transformation Level	Teachers encourage the innovative use of technological equipment. Technological equipment is used to facilitate the implementation of high-level learning activities.

Source: Adapted from Florida Center for Instructional Technology (2019).

As the process of assessing the level of technology use in teaching and learning sessions is a complex task, TIM also defines descriptors for student activities, teacher activities, and setting for each level of technology integration. This definition of descriptor can unravel the complexity of identifying the level of use of technology in teaching and learning sessions and can help educators to apply a practical understanding of the properties of effective teaching through the integration of technology (Welsh, Harmes and Winkelman, 2011).

Conclusion

Since the ability of an organization to implement change through a paradigm shift is a guarantee to achieve organizational excellence (Myers, Hulks & Wiggins, 2012), the development aspect of school leaders to manage change, as well as the ability to integrate technology in schools, should be taken seriously in the context of increasing international educational standards. This is in line with the increasing aspirations of the country in preparing the younger generation to face the needs of the 21st century in addition to increase the expectations of parents and the community towards the national education policy (Ministry of Education Malaysia, 2013).

Hallinger and Chen (2014) explain that studies on the field of leadership and educational management among Asian countries are still in its infancy. Although there is an increase in terms of the number of studies from some countries, but overall, it is still relatively low. Due to this, studies on educational leadership and management practices on school leaders in Malaysia should be conducted continously. The effort is considered as an important process towards increasing the body of knowledge on various aspects of management which can be applied by school leaders. It is suggested that a research could be conducted to look at the style of change facilitator practiced by the principal in the school as well as the level of technology integration by teachers in schools.This is because having the ultimate understanding of the aspects of technology integration from various perspectives in previous studies can help develop a comprehensive perspective on the influence or impact of change management on the technology integration process in schools.

In addition, given the lack of research on the influence of school leadership on the integration of technology in the classroom (Liu, Ritzhaupt & Cavanaugh, 2013), a study needs to be conducted to examine the influence of change management practices on the level of technology integration in schools, looking at relationship between the principal change facilitator style and the level of teacher technology integration in the school or if there are any differences in principal change facilitator style and level of teacher technology integration based on demographic factors (administrative experience, training received, and school location. The findings of the study will contribute significantly to the body of knowledge, not only for school leaders but also for those who formulate education policy in Malaysia. The findings of this study are expected to provide useful implications to the Ministry of Education Malaysia (MoE), State Education Department (JPN), District Education Office (PPD), leadership training center for principals and education leaders such as Institut Aminuddin Baki (IAB), principals, teachers and schools. The combination of aspects of change management, and teacher technology integration is important in creating effective schools let alone in the 21st century.

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