



**THE MODERATING EFFECT OF TEACHERS' HIGH LEVEL THINKING SKILLS
TRAINING PROGRAMME (THLTP): CAN TEACHER DELIVER THEIR
EDUCATION SERVICES EFFECTIVELY?**

Rahida Aini Mohd Ismail

(rahidaismail@gmail.com)

+60-174-708-150

School of Government, University Utara Malaysia, 06010 Sintok, Kedah, Malaysia

Abstract

The Fourth Industrial Revolution (4th IR) paradigm introduces the changes to most school education system worldwide to revamp and inculcate Higher Level Thinking Skills (HLTS) amongst students. HLTS comprises of analysis, synthesis, and evaluation, an essential components to education pedagogy needed to fulfill future employers' expectations and foreffective performance. This study investigates the moderating effects of Teachers' HLTS Training Program (THLTP) on the relationship between teachers' self-efficacy and Teachers' Delivery Effectiveness (TDE). Data was collected by using a quantitative survey on 500 teachers teaching in national type secondary schools in four states; Perlis, Kedah, Penang, and Perak. Multiple regressions were applied to find out the relationship between the variables, and the findings revealed that teacher efficacy has direct significant relationship on TDE. Meanwhile, hierarchical regression analysis was used to predict the moderation effect of Teachers' HLTS training program (THLTP) to modify the relationship between the variables. The result revealed that THLTP moderate the relationship between teachers' self-efficacy and TDE. This study went further to make recommendations based on the findings of the study.

Keywords: Higher Level Thinking Skills (HLTS), Teachers' Delivery Effectiveness (TDE), Teachers' HOTS Training Programme (THTP), Education Services, Moderating Effect

1. Introduction

The Fourth Industrial Revolution (4thIR) technological capacity is shifting so fast that many countries around the world aspire to produce educated workforce with the right skills. This economic trend has transformed the nature of work where automation and digitalization affects many tasks; shaping future's career counselling, career choices, and career development (Hirschi, 2018).

The structural changes in the nature of work have the potential to speed up organisations and businesses to function more effectively increasing the firms' productions, improving productivity as well as human resource function. According to Gleason (2018), the impacts of 4th IR on the global society is that many jobs are now automatable and soon other skill sets need to adapt to the new 21st century working environment. Corfe (2018) added that contemporary career paths demand for new skills; digital and non-digital related for employees to remain employable.



Due to the technological disruptions that will extensively impact the labour market, education policy also needs strong reforms. The 4thIR, particularly from a public management point of view, brings new opportunities and challenges for the education systems. The massively knowledge-based economy needs employees with essential skill sets therefore the education systems must react quickly on its curriculum developments which ought to be upgraded allowing for lifelong learning (Lee, Yun, Pyka, Won, Kodama, Schiuma, Park, Jeon, Park, Jung, Yan, Lee, & Zhao, 2018).

In relation to the education system, the World Economic Forum (2016) states that 65 percent of children that enter primary school at present will end up with new, different types of jobs that do not yet exist. To prepare 4th IR future ready workforce, the ideal is to provide quality education opportunities for all students so that they will be equipped with Higher Level Thinking Skills (HLTS) among the other essential skills to face future challenges in life and work. HLTS is a high level cognitive thinking skills comprising of “analysis, synthesis, and evaluation” that most looked for by prospective employers (Sivapakkiam, Fadzilah, Habsah, Umi, & Rozita, 2016). To overcome the challenges, many countries including Malaysia have taken the efforts to revamp the education system by developing HLTS curriculum content and new learning activities aim to develop students’ emotional, physical, intellectual and spiritual well-being relevance to the present needs and future.

Higher Level Thinking Skills (HLTS) is an important element for job market in responding to the working skills requirements of the fourth industrial revolution where human development activities involve critical and innovative thinking. Having said that, many countries have taken the initiative to overhaul their education systems focusing on curriculum development based on HLTS concept (Benjamin, Klein, Steedle, Zahner, Elliot & Patterson, 2013). Teachers’ HLTS training programme (THLTP) is to equip teachers as classroom managers to embed HLTS set in their classroom lessons to deliver the school-based education services important for students’ future success (Arvind & Shahid, 2013).

According to Hirchi (2018), though machine learning, cloud computing and big data have beginning to change our lives and jobs, some existing tasks may not be possible to automate. For example high-skilled jobs like managers, technicians, and educators often involve complicated social interaction, creative thinking, and problem solving skills that is difficult to automate. These HLT skills are crucial for present-day of work however building HLTS among secondary students in Malaysia has not made much impact as most teachers are more familiar with delivering traditional rote-learning methods (Yee, Widad, Jailani, Tee, Razali & Mimi, 2011).

The general concept of Teachers’ HLTS Training Program (THLTP) is about advanced technical skills and knowledge acquisition on learning domains to improve trainees’ performance for better learning outcomes (Guskey, 2002). In particular, Suhail and Majdoleen (2011) contend that teachers appropriate HLTS training program can help to enhance teachers’ specific knowledge, skills, and teaching attitudes that improve student learning. Past literatures showed that there has been several studies on the moderating effects of training (Sarina & Noraini, 2015; Chan, Hyuneung, Jaeeun & Jongsun Park, 2014; Ji, Huang, Liu, Zhu & Cai,



2012). So far there is limited studies conducted on THLTP. Therefore, the present study intends to fill the gap in the literature.

The main objective of the study is to empirically examine the moderation effect of Teachers' HLTS training program (THLTP) on the relationship between teachers' self-efficacy and Teachers' Delivery Effectiveness (TDE). Prior to test the main moderating variables, there is a need to conduct a descriptive study in order to supply some knowledge on the recent phenomena of THLTP that may have gone unnoticed. The specific objectives that need to be achieved are as follows: to ascertain the level of Teachers' HLTS training program (THLTP) received amongst teachers; to examine the relationship between teachers' efficacy and Teachers' Delivery Effectiveness (TDE); to examine the moderation effect of Teachers' HLTS training program (THLTP) on the relationship between teachers' self-efficacy and Teachers' Delivery Effectiveness (TDE).

2. Literature Review

Past literatures explained that the Fourth Industrial Revolution bring opportunities as well as challenges for organisations to be creative and resilient (Schiuma, 2014). This means effective education policies is vital to ensure teachers maintaining good quality public education services so that students are able to participate fully in the digital society. Many previous studies were conducted to examine the relationship between teachers' self-efficacy and teachers' delivery effectiveness in public classroom education services for many years (Aina, Olanipekun & Garuba, 2015; Oliveras, 2014; Noraini & KhairulAzmi, 2014; Pretorious, 2012). Theoretically, Teachers' delivery effectiveness can be defined as teacher's classroom behaviour to effectively manage his entire classroom process bringing good effects on students' desired learning outcomes (Teddie, Virgilio, & Oescher, 1991). Teachers' delivery effectiveness practice is considered as professional services, an ethical work practice of which the goal is to provide efficient educational services that caters for public interests. The path to effective delivery education services is when teachers continuously learn to adapt themselves to the process of change equip their students with HOT skills as these specific skills is important for their future employment, to accommodate high skilled jobs that is impossible to automate.

Researchers have identified many training programmes models namely; Noe training model (1999), four stage training model (Bratton & Gold, 1999), a systematic training and development model (Stone, 2005) and many other training models to improve the service delivery effectiveness of its employees. These training programme models describe, and analyse the training program as a cycle that comprises levels that begins from the simplest to the most complex. Past literatures witnessed that there has been an increase attention on teacher efficacy that contributes to teachers' effective teaching (Nyagah & Gathumbi, 2017, Alufohai & Ibhafidon 2015, Ko & Sammons, 2014; Nyet; 2013). For instance, teachers whom are highly efficacious are more committed to deliver their knowledge thus more effective in executing their teaching delivery tasks (Coladarci, 2010). Ahmet, Yumus and Ismail (2014) added that highly efficacious teachers experienced less burnout when compared to low efficacious teachers.

To addition, there is also an increased focus on the training programme received by teachers. Pretorious (2012) stated that the purpose of training is to enhance teachers' professionalism so



that they can perform their daily tasks more effectively. While professional identity develops over time to understand and shape teachers' beliefs; their response to work ethics, professionalism, and policy-related demands, this study extended the conceptual framework to include Teachers' HLTS Training Programme (THLTP) as a moderator that employs Guskey model, an expansion of Kirkpatrick training model, to ascertain the level of THLTP they received. Literature reviewed reflected that most researchers focused at different levels of training due to the complexities involved. The novelty of this present study is this training model uses the combination of Guskey and Kirkpatrick training model which measures five components in unison. The adopted and adapted training model comprises of reaction (R), learning (L), organizational support and change (OSC), knowledge and skills (KS), and student achievement (SA) is employed to examine the moderation effect of THTP, whether or not it can harness teachers' efficacy to effectively deliver better students' achievement in HLTS.

3. Methodology

The data were collected using a quantitative approach from teachers working in regular secondary schools in the Northern region comprising four states; Penang, Perlis, Kedah, and Perak. First, though, Malaysia's national type secondary schools consists of more than eighty percent (80 %), relatively very few studies have been conducted among teachers in relation to Teachers' HLTS training program (THLTP). Thus testing the hypothesis amongst teachers in the secondary school was important as teachers' today face many challenges in relation to education service delivery issues in today's complex social development. For example, student achievement in HLTS based on PISA 2018 results is more serious when compared to countries like China, Singapore, Macao, Hong Kong, and Taiwan (OECD, 2019). Therefore, conducting this study could provide some useful information that can assist teachers to deliver more effective HOTS education services to enhance students' creative and innovative thinking to meet up with their future work demands transformed by current disruptive technologies.

The sample populations comprised of 500 secondary school teachers selected based on their role as classroom managers. Since the northern region's total population of secondary school teachers consist of 43, 600 therefore convenience sampling technique were chosen in the sampling process where secondary schools were randomly selected throughout each states. The sampling process is followed by drawing a portion using a proportionate sampling technique from each states' total numbers of secondary school teachers. Using Sekaran (2016) quotes from Roscoe (1975) as a Rule of Thumb on estimating sample size, 500 is sufficient for most studies on population sample with an acceptable level of confidence.

Measures

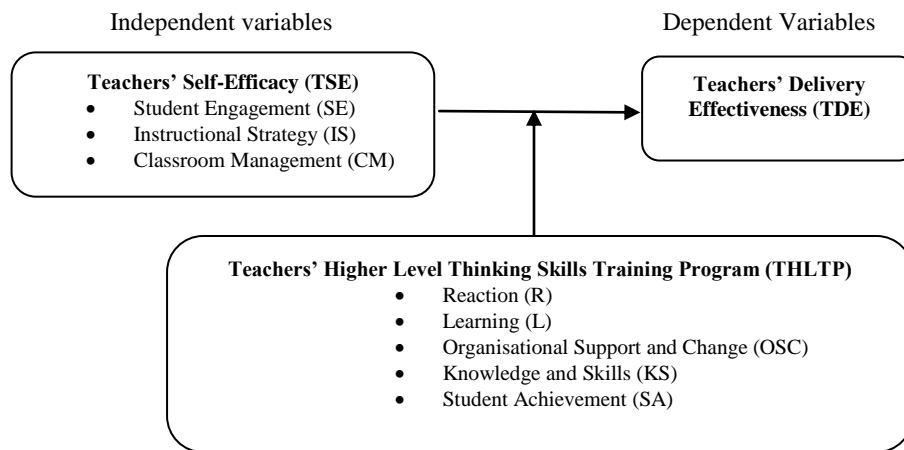
Dependent variables: Teacher's delivery effectiveness (TDE) was measured by an instrument adapted from Virgilio Teacher Behaviour Instrument (1987) by Teddie, Virgilio and Oesher (1990) designed to measure specific teacher behaviours. Other items were included from recent sources like journals locally and abroad (Ko *et. al.*, 2014; Dympna, Declan, & Deirdre, 2013). The TDE instrument were used to test teachers' behaviour on classroom management, classroom management strategy, student attention, student review and practice, questioning skill, student needs progress, teaching method, classroom climate, self-concept learners, and classroom environment. Based on the pilot study scores, the instrument was found to have a



good reliability, a Croanbach’s alpha of 0.982, which is above Hair’s (2010) rule of thumb on acceptable level that is higher than 0.70.

Independent variables: Teacher efficacy instrument was adapted from past researchers (Beck, 2014; Dellinger *et.al.*, 2008) to measure teachers’ ability to execute specific tasks namely student engagement (SE), instructional strategies (IS), and classroom management (CM) in relation to HLTS to suit the study. The measurement items of teacher efficacy sub-dimensions were generated based on the current education policy reports and journals from localand abroad (for example, MEB, 2013; Gullistan, Saido, Abu Bakar&Omad, 2015; Cheah, 2015). The teacher efficacy instrument were used to test the ability of teachers in SE, IS, and CM. Based on pre-test study scores, teacher efficacy instrument was found to have a good reliability with a Croanbach’s alpha value of 0.831 that is higher than 0.70, that is on acceptable level.

Moderating variables: The training programme was developed by Kirkpatrick (1959), and advanced by Guskey (2000) which was later adapted and modified to suit the context of the present study which focused on HOTS. The measurement items were reviewed from past literatures (for examples: Guskey, 2002; Barohny & Heining-Boyton, 2007; Mohd, Yahya, Muhamad & Nabilah, 2015; Mohd Yusoff, Azlin, Mansor, Johari, & Norlizah, 2016). Teachers’ HOTS Training Program (THTP) has five dimensions, and the uniqueness of this study is that the training program is treated as uni-dimensional construct to add parsimony. Unlike previous studies, training program were measured separately, at different levels (Sahin, 2006; Muhammad &Sharan, 2010; Muhammad, Muhammad, Usman, & Chaudry, 2011; Muhammad, Iqbal, Maharvi, & Muhammad, 2011; Paslawski, Kearney, & White, 2014, Dhliwayo & Kerubo, 2014). A pre-test study were conducted and found that the Cronbach’s Alpha value is 0.982 which confirmed there is high reliability and high quality data. Below is the conceptual framework of the study.





4. Results

Table 1 shows the Pearson correlations coefficient for all the variables tested in this study. Table 1 clearly showed that Teachers' Delivery Effectiveness (TDE) is significantly associated with teacher efficacy. Meanwhile, TDE showed significant relationship with all the three dimensions in teacher efficacy namely efficacy in student engagement (SE), efficacy in instructional strategy (IS), and efficacy in classroom management (CM). Also, TDE indicates the significant relationship with HOTS Training Program used in this study. Overall, TDE is significantly associated with all the variables used in this study.

Table 1: Correlation analysis of TDE, Teachers' Self-Efficacy, and Teachers' Higher Level Thinking Skills Training Program (THLTP)

	TDE	Teacher's Self-Efficacy	SE	IS	CM	HLTS
TDE	1					
Teacher Efficacy	0.775**	1				
SE	0.619**	0.888**	1			
IS	0.733**	0.913**	0.726**	1		
CM	0.714**	0.860**	0.630**	0.685**	1	
HLTS	0.701**	0.565**	0.447**	0.586**	0.464**	1

** . Correlation is significant at the 0.01 level (2-tailed).

Table 2 presents the descriptive analysis results using seven Likert type scales on the level of Teachers' HLTS Training Program (THLTP), which revealed that THLTP dimensions namely; reaction, learning, organizational support and change, knowledge and skills, and student achievement is at good level with high mean score. This suggests that the level of THLTP received among teachers in the secondary schools in the northern region in the states of Penang, Kedah, Perlis, and Perak is overall high.

Table 2: Descriptive Statistics on Overall Teachers' HLTS Training Program (THLTP) mean scores and standard deviations

Moderating Variables	Mean	Standard Deviation	Level
Teachers' HLTS Training Program (THLTP)			
Teachers' HLTS Training Program (THLTP) dimensions	5.57	0.54	High
Reaction (R)	5.37	0.76	High
Learning (L)	5.48	0.89	High
Organizational support and change (OSC)	5.82	0.82	High
Knowledge and skills (KS)	5.64	0.76	High
Student achievement (SA)	5.68	0.79	High

Meanwhile, Table 3 presents the Multiple Regression Analysis results to test the relationship between teachers' self-efficacy and Teachers' Delivery Effectiveness (TDE). The results indicated that the predictor variables Teachers' Self-Efficacy explained 61.7 percent of TDE



($F=656.854$, $p<0.01$). Therefore it is assumed that Teacher Efficacy significantly predicted TDE.

Table 3: The relationship between Teachers' Self- Efficacy (TSE) and TDE

	B	T	Sig.
TSE	0.785	25.629	.000
R ²	0.617		
F	656.854		
Sig.	0.000		

Notes: ** $p<0.01$, * $p<0.05$

Table 4 presents the overall scanning of the interacting effects between Teachers' Higher Level Thinking Skills Training program (THLTP) on the relationship between the Teachers' Self-Efficacy and Teachers Delivery Effectiveness (TDE). The result showed that Teachers' Self-Efficacy variable were entered in step 1 and explained 61.7 percent of the variance. This is followed by step 2 of which THLTP was entered and the total variance of the model was at 71.4 percent. Finally, in step 3, the result of the insertion of the interaction terms showed an additional variance at 71.9 percent. A slight increase of r^2 (.005) was found and the sig. F change from step 1 to 2, and from step 2 to 3 was significant at the 1% level. Next upon the detailed scanning of the beta co-efficient for the individual interaction terms between THLTP × Teachers' Self-Efficacy ($\beta= -.078$, $t= -2.756$, $p=.006$) was significant at $\alpha=0.001$ level. The interactions suggested strong support for the moderating effects of THLTP on the relationship between Teachers' Self-Efficacy namely: student engagement (SE), instructional strategy (IS), and classroom management (CM).

Table 4: Hierarchical Regression Results: the Moderating Effect of Teachers' High Level Thinking Skills Training Program (THLTP) on the Relationship between Teachers' Self-Efficacy (TSE) and Teachers' Delivery Effectiveness (TDE)

Variables	Standardized Beta		
	Step1	Step 2 Without interaction	Step3 With interaction
TSE	0.785***	0.572***	0.539***
THLTP			0.384***
TSE x THLTP	0.617	0.377***	-0.078***
R ²		0.714	0.719
Adjusted R ²	0.616	0.712	0.717
R ² Change	0.617	0.097	0.005***
F Change	656.854	507.776	346.538
Sig. F Change	0.000***	0.000***	0.000***

Sig. level ***.001 ** $p<0.01$ * $p<0.05$

Discussions of Findings

Referring to the first research objective concerning HLTS training programme received among teachers using descriptive analysis, it is found that the secondary school teachers received high level of HLTS training program in all four states namely Perlis, Kedah, Perak and Penang. They



agreed the high level of training received affected their learning, reaction, knowledge and skills, perceptions on students' learning outcomes, and organizational support and change. The result suggest that teachers' high level of HLTS training helped to fulfil their schools' organizational goals, updated new knowledge that assisted them to deliver their secondary level education services more effectively.

The results is consistent with other studies (Bikos, Tsigilis, & Grammatikopoulus, 2011; Asfaw, Argaw, & Bayissa; 2015). They found that individuals who received adequate training program help to harness their self-efficacy beliefs (Bikos et.al., 2011); increase their potentials by updating their new-learned skills (Asfaw *et.al.*, 2015) to carry out their tasks more efficiently. On the other hand, several studies found that insufficient training received can affect teachers' motivation (Yazan, Semreen, & Muhammad, 2011), classroom management skills (Asaf, Asad, & Muhammad, 2011; Fatemeh & Abdorreza, 2015). For instance, insufficient training program resulted in poor classroom management skills like lower level thinking questioning techniques (Nyet, 2013), poor instructional strategies (Fakeye & Adeye, 2013) and teacher-centered learnings (Pezhman & Moormala, 2015).

Meanwhile, the result of the second objective concerning the relationship between teachers' self-efficacy (TSE) and Teachers' Delivery Effectiveness (TDE) showed that it is significant. Majority of the studies found that teachers' self-efficacy can bring significant influence on teacher effectiveness in delivering their teaching and learning, and students' achievements (Ahmad & Mazieh, 2012; Ereno & Nunez, 2014). The study contributes to Bandura's (1977) Socio Cognitive Theory particularly in the area of Public Management on teacher efficacy variables, the three dimensions which focus on secondary school teachers, on the ability of managing their classrooms to deliver effective HLTS classroom services.

Lastly, the result of the third objective on the moderating effects of Teachers' High Level Thinking Skills Training Program (THLTP) on the relationship between teachers' self-efficacy and Teachers' Delivery Effectiveness (TDE) showed that it is significant. The results indicated that THLTP can strengthen Teachers' self-efficacy and Teachers' Delivery Effectiveness (TDE).

The results are same with several past studies which showed that there is significant moderation effects of training (Dunst *et.al.*, 2012; Lee *et. al.*, 2014). An example is a research conducted by Li Ji *et.al* (2012) who found employees' training has positive effect on organisations' performance in a sustainable development.

5. Conclusion and Recommendation

As Malaysia embraces the rise of the Fourth Industrial Revolution (4IR), the Ministry of Education (MoE) continue to revamp the country's education system by embedding HLT skills set in the schools' curriculum development. Educational systems and teachers are also facing challenging tasks resulting from this constantly advancing technology. This study provide an additional information to the body of knowledge by examining on the relationship between the two variables; Teachers' self-efficacy as independent variable and Teachers' Delivery Effectiveness (TDE), an independent variable. In addition, this study contributes theoretically by measuring the components of Teachers' High Level Thinking Skills Training Program (THLTP) in one dimension to add parsimony of which all components fit with TDE. Of course,



this study has its own limitations of which data collection process involved only secondary schools in four out of thirteen states of Malaysia, and relied on self-report questionnaires from selected group of teachers. Nevertheless the results of this study indicates that the Malaysian teachers received high level of HLTS training program meaning that teachers received sufficient training and mentally prepared to manage present challenging tasks in preparing their students for 21st century classrooms. Most importantly, the result established that Teachers' High Level Thinking Skills Training Program (THLTP) played a critical role to harness teachers' HLTS abilities in maintaining a high teaching standard to ensure effective education services delivered at their respective schools.

References

- Aina, J. K., Olanipekun, S. S., & Garuba, I. A. (2015). Teacher's effectiveness and its influence on student's learning. *Advances in Social Sciences Research Journal*, 2(4), 88-95.
- Ahmad, M. & Marzieh, P. T. (2012). The impact of teacher self- efficacy on the students' motivation and achievement. *Theory and Practice in Language Studies*. 2 (3), 483-491, Doi:10.4304/tpls.2.3.
- Ahmet C. S, Yumus, B. & Ismail, E. (2014). A study on the relationship between teacher efficacy and burn-out. *European Journal of Educational Research*, 3(4), 159-166.
- Alufohai, P. J. & Ibhafidon, H. E. (2015). Influence of teachers' age, marital status and gender on students' academic achievement. *Asian Journal of Educational Research*, 3(4), 60-66.
- Asaf, N., Asad, A. R., & Muhammad, S. K. (2011). Evaluation of teachers' training procedure and pedagogical skills in adult literacy. *International Journal of Business and Social Science*, 2 (11), 120-124.
- Asfaw, A. M., Argaw, M. D., & Bayissa, L. (2015). The impact of training and development on employee performance and effectiveness: A case study of district five administration office. Bole Sub-city, Addis Ababa, Ethiopia. *Journal of Human Resource and Sustainability Studies*, Vol.3, 188-202. <http://dx.doi.org/10.4236/ihrs.2015.34025>
- Arvind, H. & Shahid, A. (2013). Emerging Trends in Teacher's Education. *The Macrotheme Review* 2(2). Special Issue on Education and Training. Ranchi University: Waljat College of Applied Sciences.
- Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.
- Barohny, E. & Audrey, L. H. (2007). Impact of an English as a second language professional development program. *The Journal of Educational Research*, 36- 47, Vol. 101(1).
- Benjamin, R., Klein, S., Steedle, J., Zahner, D., Elliot, S & Patterson, J. (2013). The Case for Critical-Thinking Skills and Performance Assessment. *Council for Aid in Education*.
- Bikos, K., Tsigilis, N. & Grammatikopoulos, V. (2011). The effect of an introductory training program on teachers' efficacy beliefs. *International Journal of Humanities and Social Science*, Vol. 1(14), 37-40.
- Bratton, J., & Gold, J. (1999). *Human resource management: Theory and practice* (2nd ed.). Great Britain: Macmillan Business.
- Chan, L., Hyuneung, L., Jaeun, L. & Jongsun, P. (2014). A multiple group analysis of the training transfer model: exploring the differences between high and low performers in a Korean insurance company. *The International Journal of Human Resource Management*, Vol. 25(20), 2837-2857.



- Cheah, K. S. L. (2015). Teachers' classroom control and decision making: A case study of a private school in Subang, Selangor. Vol. 1(1). *Australian Journal of Business and Economic Studies*, 1-7.
- Coladarci, T. (2010). Teachers' sense of efficacy and commitment to teaching. *The Journal of Experimental Education*. Vol. 60(4), 323-337. <http://dx.doi.org/10.1080/00220973.1992.9943869>
- Corfe, S. (2018). 4IR in the Workplace: Ensuring employers and employees benefit. *The Social Market Foundation*.
- Dhliwayo, S. & Nyanumba, L. K. (2014). An evaluation of an on the job training program at a UK based public health care company. *Problems and Perspectives in Management*, Vol. 12(2), 164-172.
- Dympna, D., Declan, F., & Deirdre, M. (2013). What is 'good' teaching? Teacher beliefs and practices about their teaching. *Irish Educational Studies*, Vol.32:1, .83-108. DOI: 10.1080/03323315.2013.773228
- Ereno, J. R & Nunez, K. T. (2014). What makes a teacher a better teacher? A hierarchical regression analysis of self-efficacy and commitment as predictors of faculty members job performance. *International Journal of Asian Social Science*. Vol.4 (4), 492-498.
- Fakeye, D. O & Ayede, E. (2013). Teachers' questioning behaviour and instructional organisation as correlates of students' achievement in English Language. *Global Journal of Human Social Sciences*. Vol. 13 (2).
- Gullistan A.M. Saido, SaedahSiraj, Abu Bakar N. & OmadSaadallah Al-Amedy. (2015). Teaching strategies for promoting Higher Order thinking skills: A case of secondary science teachers. *Malaysian Online Journal of Educational Management*, Vol.3 (4), 16-30.
- Fatemeh, A. & Abdorreza, T. (2015). A Survey of EFL Teachers' attitudes towards critical thinking instruction. *Journal of Language Teaching and Research*, Vol. 6(2), 388-396 DOI: <http://dx.doi.org/10.17507/jltr.0602.20>
- Guskey, T. R. (2000). *Evaluating Professional Development*. Thousand Oaks, CA: Corwin Press.
- Guskey, T. R. (2002). Professional development and teacher change. *Teachers and Teaching: Theory and Practice*, 8, 381- 391. <http://dx.doi.org/10.1080/135406002100000512>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis*. Englewood Cliffs, NJ: Prentice Hall
- Hirschi, A. (2018). The fourth industrial revolution: Issues and implications for career research and practice. *The Career Development Quarterly*, 192-204.
- Jia, L., Huang, J., Liu, Z., Zhua, H., & Cai, Z. (2012). The effects of employee training on the relationship between environmental attitude and firms' performance in sustainable development. *The International Journal of Human Resource Management*, Vol. 23(14), 2995-3008.
- Ko, J., Sammons, P., & Bakkum, L. (2014). Foreword by Arran Hamilton & Wan Saiful Wan Jan. *Effective teaching: A review of research and evidence*. CfBT Education Malaysia 35th Anniversary Research Series. www.cfbt.com.my
- Lowden, C. S. (2003). *Evaluating the effectiveness of professional development*. PhD Thesis. Seton Hall University.



- Malaysia Education Blueprint, 2013-2025. (2012). Preliminary Report. <https://www.moe.gov.my/images/dasar-kpm/PPP/Preliminary-Blueprint-Eng.pdf>
- Ministry of Education, Malaysia. (2013). Malaysia Education Blue-print 2013: Preliminary Report 2013-2025. Retrieved from <http://www.moe.gov.my/en/pelan-pembangunan-pondidikan-malaysia-2013-2015>
- Min, H. L., Jin, H. J. Y., Andreas, P., DongKyu, W., Fumio, K., Giovanni, S., HangSik, P., Jeonghwan, J., Kyung, B. P., Kwang, H. J., Min-Ren, Y., Sam, Y. L., & Xiaofei, Z. (2018). How to respond to the fourth industrial revolution, or the second information technology revolution? Dynamic new combinations between technology, market, and society through open innovation. *Journal of Open Innovation. Technology. Market. Complexity*, 4, 21; doi:10.3390/joitmc4030021.
- Mohd, A. M., Yusoff, J. A., Azlin, N., Mansor, R. Johari, K. O., & Norlizah, C. H. (2016). Evaluation of School Based Assessment Teacher Training Programme. *Creative Education*. Vol. 7, 627-638. <http://www.scirp.org/journal/ce> <http://dx.doi.org/10.4236/ce.2016.74065>
- Mohd, S., Yahya, M. H. I., Muhamad F. M. S & Nabilah, A. (2015). Science teachers' continuous professional development: nature of school based teacher training and its implementation. Full Paper Proceeding MISG-2015. Vol. 1, 94-106. Retrieved from www.globalilluminators.org
- Muhammad, A. B. & Sharan, K. (2010). The role of individual and training design factors and training transfer. *Journal of European Industrial Training*. Vol. 34(7), 656-672. DOI 10.1108/03/090591011070770
- Muhammad, M. K., Muhammad, A., Usman, Y., & Chaudry, A. R. (2011). Assessing impact of management support on perceived managerial training effectiveness in public organizations of Pakistan. *European Journal of Social Sciences*, Vol. 22 (1), 106-125.
- Muhammad, Z., Iqbal, M. W., Maharvi, S. A. M., & Muhammad, M. K. (2011). An empirical analysis of the relationship between characteristics and formative evaluation of training. *International Business Research*, Vol. 4 (1), 273-286.
- Noe, R.A. (1999). Employee training and development. Irwin/McGraw-Hill. Publisher: Craig S. Beytien.
- Nooraini, O., & Khairul, A. M. (2014). Thinking Skill Education and Transformational Progress in Malaysia. *International Education Studies*. Vol. 7(4).
- Gleason N. W. (2018) (ed.), *Higher Education in the Era of the Fourth Industrial revolution*. Singapore: Palgrave Macmillan.
- Nyagah, G & Gathumbi, A. (2017). Influence of teacher characteristics on the implementation of non-formal basic education curriculum at the non-formal education centres in Nairobi, Mombasa and Kisumu Cities, Kenya. *International Journal of Education and Research*. Vol. 5(1), 207-221.
- Nyet, M. S. (2013). Exploring primary Science teachers' creativity and attitudes through responses to creative questions in University Physics Lessons. *British Journal of Education, Society & Behavioural Science*, 3(1), 83-108. Retrieved from www.sciendomain.org
- Organization for Economic Co-operation and Development (OECD). (2019). Insights and interpretations. https://www.oecd.org/pisa/PISA_2018_Insights_and_Interpretations



- Oliveras, Y. (2014). The empirical relationship between administrator ratings of teacher effectiveness & student achievement on the state of Texas assessment of academic readiness. PhD Thesis. U.S.A: Pennsylvania State University.
- Paslowski, T., Kearney, R., & White, J. (2014). Measuring the effectiveness of faculty facilitation training in problem-based learning in a medical school. *Creative Education*. Vol.5. Pp.164-170. Retrieved from <http://www.scirp.org/journal/ce>
- Pezhman, Z., & Moomala O. (2015). Students' perceptions toward using classroom debate to develop critical thinking and oral communication ability. *Asian Social Science*. Vol. 11 (9), 158-170.
- Pretorius, S. G. (2012). The Implications of Teacher Effectiveness Requirements for Initial Teacher Education Reform. *Journal of Social Sciences*. 8 (3), 310-317.
- Sahin, V. (2006). Evaluation of in-service teacher training program 'The Certificates for teachers of English' at Middle East Technical University School of Foreign Languages. PhD Thesis in Education Sciences.
- Sarina, M. N. & Noraini, N. (2015). Training as a moderator in the relationship between employee's collaboration, top management support and IT support with knowledge management in Malaysian public organization. *International Academic Research Journal of Business and Technology*. Vol. 1(2), 108-116.
- Schiama, G. (2017). Arts catalyst of creative organisations for the fourth industrial revolution *Journal of Open Innovation: Technology, Market, and Complexity*. 3:20 DOI 10.1186/s40852-017-0072-1
- Seet, P, Jones, J, Spoehr, J & Hordacre, A (2018). The Fourth Industrial Revolution: the implications of technological disruption for Australian VET. Adelaide:National Centre for Vocational Education Research (NCVER).
- Sekaran, U & Bougie, R. (2016). Research methods for business: A skill building approach (5th ed.). Hoboken: John Wiley & Sons.
- Singleton, R. A. & Straits, B. C. (2005). *Approaches to social research*. 4th ed. New York: Oxford University Press.
- Sivapakkiam, R, Fadzilah, A. R., Habsah, I., Umi, K. A. M., & Rozita, R. S. (2016). Teachers' levels of knowledge and interest on Higher Order Thinking Skills (HOTS) according to the field taught and category of schools. *Journal of Modern Education Review*, Vol. 6(9), 611–621 Doi: 10.15341/jmer(2155-7993)/09.06.2016/005
- Stone, R. (2005). Human resource management (2nded).Australia: John Wiley & Sons Ltd.
- Suhail, M. A., & Majdoleen, S. B. A. R. (2011). The effects of a training program in improving instructional competencies for Special Education Teachers in Jordan. *Educational Research*, Vol. 2(3), 1021-1030 Retrieved from <http://www.interestjournals.org/ER>
- Teddie, C., Virgilio, I., & Oescher, J. (1990). Development and validation of the Virgilio Teacher Behaviour Inventory. *Educational and Psychological Measurement*, Vol. 50(2), 93-99.
- Yazan, A. A., Semreen, A., & Muhammad, K. K. A. (2011). Effectiveness of teaching approaches of in-service training courses for EFL teachers in Jordanian schools. *English Language Teaching*. Vol. 4 (1), 190-196. Retrieved from www.ccsenet.org/elt.



Yee, M. H., Jailani, M., Yunus, R., Hassan, W. O., & Tee, T. K. (2011). The perception of the level of Higher Order thinking Skills among technical education students. *2011 International Conference on Social Science and Humanity*. Vol.5, 281-285.