The Eurasia Proceedings of
Educational & Social Sciences (EPESS)
ISSN: 2587-1730

The Eurasia Proceedings of Educational & Social Sciences (EPESS), 2017

Volume 6, Pages 177-188

ICEMST 2017: International Conference on Education in Mathematics, Science & Technology

SELF EFFICACY AS MEDIATOR BETWEEN LEARNING AND BEHAVIOUR AMONG IN-SERVICE SCIENCE TEACHERS TRAINING PROGRAMME OF HIGHER ORDER THINKING SKILLS

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Abstract: The aim of this study is to explore the relationship between learning and behaviour among Malaysian science teachers after attending the In-Service Teachers Training Programme of Higher Order Thinking Skills (HOTS) which was mediated by their self-efficacy. The four-level model of Kirkpatrick was applied to evaluate training effectiveness at two levels, learning and behaviour based on the application of Bandura's social cognitive theory. Multiple regression analyses indicate that self-efficacy mediated the relationship between learning (Knowledge, Skills, Attitude change) and behaviour. One of the practical implications emerging from this study is the importance of promoting and encouraging teacher participation in hand-on and HOTS-oriented activities. Such activities not only develop their self-confidence, but enhance their self-efficacy when implementing teaching and learning innovations related to HOTs. In terms of modification of the four-level model, the school organiser of the HOTS Programme should also include "self-efficacy" in the evaluation process in order to improve its effectiveness.

***Keywords*:** Learning, self-efficacy, behaviour, training, higher order thinking skills.

Introduction

Training can be an effective way to equip workers with the skills, knowledge and capabilities to ensure they can deal with global challenges (Bhatti, Ali, Mohd Isa, & Battour 2014). In order to meet these goals, the organization has allocated a substantial amount of funds to improve the knowledge and skills of workers (Aguinis & Kraiger, 2009). This effort pays off only when employees actually transfer the contents learned into practice (Hutchins et al., 2010). Training transfer which are knowledge and skills applied to the workplace is important and indicates the effectiveness of training. Hence, it is important to evaluate learning, behaviour and transfer of training associated with the effectiveness of the training.

In the context of education, training can enhance the quality of education as it exposes educators to innovation aimed for professional development. Studies indicate the low impact of creative and critical thinking training programme on teacher practice despite having it disseminated among teachers since two decades ago as evident in the low standard of teacher and student thinking skill (Ministry of Education 2012). Conversely, teachers are expected to nurture students' higher order thinking skills (Kong, 2006; Loving & Wilson, 2000; Wang, Johansson, Bjorkstrom, & Nordstrom, 2010) if they have it in their pre-service or in-service training (Kong, 2006). The In-Service Teachers Training Programme of Higher Order Thinking Skills (HOTS) were designed to prepare teachers for instruction of higher order thinking skills in the context of science modules, prepared as part of a large-scale educational reform. It is therefore important to examine the extent to which knowledge and skills acquired from the training are transferred in the workplace or transfer of training.

In the implementation of such training programme, stakeholders have invested millions for teacher professional knowledge and new skills. In the Malaysian context, the Education Ministry allocated RM 500 million to train

- Selection and peer-review under responsibility of the Organizing Committee of the conference

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teachers implement higher order thinking skills in their teaching and learning process (Ministry of Education 2013). Hence it is deemed necessary to carry out a study to investigate to which extent the knowledge and skills gained from such training being applied at the workplace or training transfer.

Transfer of training is a critical aspect and a core issue for human resource development (Burke, 2007). To ensure transfer of training "learned behavior must be generalized to the job context and maintained over a period of time on the job" (Baldwin & Ford, 1988, p. 63). Unfortunately, in the context of the evaluation of higher order thinking skills (HOTs) training, evaluation only focused on the first and second levels which are reactions and learning (Ministry of Education, 2013). Further studies are necessary to evaluate the third level which is behaviour and the extent to which learning is transferred to the job context.
According to adult education theory by Michael Knowles (1984), the five factors influencing knowledge and skill transfer from training to workplace are self-efficacy, experience, readiness to learn, learning orientation and intrinsic motivation. As adults, teachers are expected to apply the knowledge and skill learnt from the training to their workplace but any behavioural change depends on many factors. Hence this study aims to identify self-efficacy factor as the moderator in the relationship between learning and behaviour at workplace.

Background of Study

Education reforms abroad (National Research Council (NRC) 1996, 2000; National Science Teachers Association (NSTA) 2003) and the Standards for Professional Development in Schools (NCATE 2001), require teachers to apply constructivist learning and higher order thinking skills in teaching (Barak et al. 2007; Dori and Herscovitz 2005 Tobin et al. 1990). In Malaysia, teachers are given in-service trainings related to creative and higher-order thinking skills besides being exposed to various thinking tools, learning and teaching strategies aimed at enhancing learners' thinking skills (Poh 2005).

Despite its introduction for more than two decades, the Critical and Creative Thinking Skills Programme has yet proven to be effective as research findings indicate that the standard of thinking skills among students and teachers is still relatively low (Ministry of Education 2012). Results from TIMSS 2011 and PISA 2009 show Malaysian students lack skills in interpreting complex information and identifying suitable strategies for solving problems that require higher order thinking skills. This serves as a wake-up call to step up efforts towards improving learner performance in science and mathematics. The findings from TIMSS and PISA have provided input for the Malaysia Education Blueprint (MEB) 2013-2025 of which the key performance indicator to be achieved is improved average scores in 2015 TIMSS and PISA which can rank Malaysia in the top quarter tier in 2025. Hence the Higher-order Thinking Skills Training Programme (HOTs) has been implemented through which teachers are equipped with knowledge, skills, teaching strategies and thinking tools to help them improve learners' critical thinking skills.

Problem Statement

Training facilitates an organisation to equip the workers with skills, knowledge and capabilities in facing the global challenges (Bhatti, Ali, Mohd Isa, & Battour 2014;). To attain the objective, organisations allocate a large fund for the upgrading of their workers' knowledge and skills (Aguinis & Kraiger, 2009). The efforts yield promising returns if the workers are able to apply to workplace what has been learnt from the training programme (Hutchins et al., 2010). It nevertheless remains questionable to what extent teachers innovatively apply what has been learnt to their workplace. Hence it is vital to evaluate the effectiveness of such training by identifying the extent to which teachers' behavioural changes are evident based on the knowledge and skill transfer at workplace.

In the corporate sector, training evaluation or effectiveness is a common practice to ensure returns of human capital investment for evaluating investment returns (Neo, 2010; McGuire & Jorgensen, 2011; Werner & DeSimone 2012). However in the field of education, training evaluation has been in focus only recently (Guskey 2000). In regard to evaluation of training in higher order thinking skill training (HOTs), it involves only the first and second level of evaluation which are the reaction and learning before and after training (Ministry of Education 2013). Hence it is deemed necessary to explore in-depth the next level of evaluation which is the behaviour.

According to Kirkpatrick (1959), behavioural evaluation refers to what extent participants apply knowledge and skills learnt at the training to their workplace. Based on the social cognitive theory, Zimmerman (1990) discovered that learning was a significant factor for enhancing self-efficacy. Bandura social cognitive theory by

Bandura (1986) posits that self-efficacy is individual belief of what he or she can achieve despite all the challenges. In this study, if the participants of the higher order thinking skill training programme have fully digested the training, their self-efficacy could be upgraded and such behavioural change could be seen in the individual self, organisation, community and the surrounding. D

Several studies (Sukserm & Takashi 2012; Frayne & Latham, 1987; Gist, 1989; Gist, Schwoerer, & Rosen, 1989) also show self-efficacy as the mediating factor in the model of training transfer. Sukserm & Takashi (2012) discovered that self-efficacy was the mediator between learning and ethical behaviour but this aspect is widely researched in clinical psychology but rarely explored in the context of human resource development or training programme. Hence it is imperative to carry out a study in the context of training programme to fill the gap in research on self-efficacy as the mediator that links learning and behaviour.

The initiative for the study was triggered by past studies which investigated the three variables (learning, self-efficacy and behaviour) simultaneoysly (Sukserm & Takashi 2012). Several past studies investigated the link between learning and self-efficacy (Zimmerman, 1990, 2000; Aliegro, 2008; Gist 1989; Hodges, 2008; Tannenbaum, Mathieu, Salas, & Cannon-Bowers (1991). While a few studies (Judge and Bono, 2001; Zhao et al., 2005; Kosuwan et al., 2007; Gist, Stevens, & Bavetta 1991; Tannenbaum, Mathieu, Salas, & Cannon-Bowers 1991; Frayne and Latham 1987) investigated self-efficacy and behaviour. In this study, Kirkpatrick's four-level of evaluation is used to evaluate the training (Pershing and Pershing, 2001; Kraiger et al., 2004) and to argue on the human resource development evaluation model (Holton, 1996; Bates, 2004). An empirical study on the link among the three variables (learning, self-efficacy and behaviour) is hoped to fill in the research gap in addition to investigating the effects of the three variables on enhancing effectiveness of training.

The role of self-efficacy as the mediator and moderator has been widely debated and several researchers discovered that self-efficacy was a mediating variable (Ott et al., 2000; Li et al., 2002; Hastings & Brown, 2002). On the other hand, a few past studies revealed that there was no evidence suggesting self- efficacy as a moderating variable (Tedesco et al., 1990; Kongjinda & Witchawut, 2002; Namsrisakulrat, 2003). Nevertheless, self-efficacy is more dominant as a mediating variable than a moderating variable between learning and behaviour. The past studies did not focus on the relationship between learning, self-efficacy and behaviour in the context of higher order thinking skills. The understanding on the variables gives advantages to an organisation involved (especially the Education Ministry) in the training of higher order thinking skills in order to enhance the effectiveness of such training.

This study aims at exploring the direct and indirect links among three variables which are learning, self-efficacy and higher order thinking skill behaviour. This study differs from the previous ones as it investigated the relationship of all three variables with the combined of two models which are Kirkpatrick's Four-level Evaluation Model (1959) and Training Transfer Model by Baldwin dan Ford (1988). With the integration of both models, other indirect factors which influence behaviour could be explained since Kirkpatrick's model alone may not be sufficient to offer explanation. The study focused on self-efficacy as the moderator between learning and behaviour based on Bandura's social cognitive theory. The objective of the study is to enhance the higher order thinking skill behaviour and the indicator for the effectiveness of the training.

Training Evaluation Models Underpinning the Study Transfer of Training Model

Both of the models Kirkpatrick’s Training Evaluation Model and Baldwin’s Transfer of Training Model (Kirkpatrick, 1994; Baldwin and Ford, 1988) underpinned the study of self-efficacy as a mediator between learning and behaviour. It is due to the inability of Kirkpatrick’s model to address factors that could limit or promote transfer of learning. Transfer of training is defined as the extent to which trainees are able to apply knowledge, skills and attitudes learned in a training to the workplace effectively (Newstrom, 1984; Wexley and Latham, 1991, cited in Subedi, 2004).

For training to have occurred effectively, learned behaviour must be applied to the job context and maintained over a period of time (Baldwin and Ford, 1988). Application of the innovation has learnt from the training or transfer of training depends on a number of factors, including the intent or motivation of the learner (trainee characteristics), the workplace environment, including supervisory support (organizational environment and culture), and the instructional design, as well as delivery features (job relevance) of the training programme (Aluko 2014; Subedi, 2004), training design, trainee characteristics, work environment characteristics (Baldwin and Ford 1988) as well as constraints and opportunities to perform learned behaviours on the job. Transfer of training is a problem because the large amount of resources expended on training hardly pays off (Holton, Bates and Ruona, 2000; Holton, Bates, Bookter and Yamkovenko, 2007). According to Baldwin and Ford, self-

efficacy (trainee characteristics) is one of the factor that affects learned behaviours leading to better results in the post-training context. In this study, Baldwin's Transfer of Training Model are fused in relation to the workplace environment with the second level of Kirkpatrick's model.

Kirkpatrick Four-Level Evaluation Model

It is imperative to choose the correct training model and scholars share similar ideas on the selection of evaluation model. Kirkpatrick's four level evaluation model is chosen to evalute the training on higher order thinking skills in line with the operational definition of evaluation used in this study. According to Kirkpatrick (1959), training evaluation or effectiveness is to be made at every level involving participants' reactions towards the training programme, learning, behaviour and results. Every level in Kirkpatrick's model is interrelated hence it is vital to evaluate every level following successive order. successively Nevertheless in the context of this study, evaluation focuses on the second and third levels which are learning and behaviour that involves learning transfer concept.

Kirkpatrick's model has been used as the framework for evaluating training effectiveness since five decades ago (Holton, 1996; Kirkpatrick & Kirkpatrick 2010; Giangreco, Carugati, Denmark & Sebastiano, 2010) and this model is also one of the pioneer models used widely in evaluating human resource development as the model is deemed simple and easy to understand (Noe 2010; Griffin 2010; Giangreco et al. 2010). Nevertheless Kirkpatrick's model has its critiques too (Alliger & Janak1989; Cannon-Bowers, Salas, Tannenbauk & Mathieu 1985; Holton 1996). Among the criticisms are that on the correlation between the low levels, that each level is unrelated with the training objective and that the model is too simplistic as it focuses on taxonomy rather than hierarchy.

Kirkpatrick's Four Level Evaluation Model is divided into four levels; the first level is reaction followed respectively by learning, behaviour and results (Kirkpatrick, 1998) with each level being interrelated and influencing the next level. For instance, reaction relates to learning which then influences behaviour change at the workplace that later affects the organisation.

The first level of Kirkpatrick's four-level model is reaction. Reaction measures the extent to which trainee satisfaction or impressions of the program (what the trainees/fellows thought and felt about the training). Evaluation of reaction is important because trainees' positive or negative reactions towards a training course influence learning. If participants' give positive feed backs or reactions to the training, they are motivated to learn and bring about more learning. An increase in learning leads to improved knowledge, skills and positive attitude towards innovation introduced during the training. Learning is the second level of Kirkpatricks' four-model. Learning measures how much participant gain knowledge, improve skills and change their attitudes after attending the course. Through the concept of learning or training transfer, participants can later apply the knowledge and skills at their workplace as reflected in a behavioural change (Clark 2000; Baldwin and Ford, 1988; Cascio, 1991). The third level is behaviour. Behavior measures the extent to which participants could apply knowledge and skills learned to the job context. In other words, evaluation here measures the transfer of what has been learned back to the workplace or training transfer. Results measures the effects on the institutional environment resulting from the fellows' performance. Nevertheless, consideration has to made between learning level and behaviour which is the learning or training transfer concept that refers to the participants' application of knowledge, skills and/or attitude learnt from the training to the workplace (Clark 2000).

Link between Learning, Self-efficacy and Behaviour

Learning and behavior were triggered from the four-level model of Kirkpatrick (1959). Learning measures the extent to which participants' knowledge increases, improved skills and positive attitude changes after attending the training program. Alliger and Janak (1994) define learning as the principles, facts and techniques understood and accepted by participants. Bates (2004) argues that learning evaluation is an indicator that can be measured from learning. Winfrey (1999) stated that learning was beyond the satisfaction of the participants which is efforts to assess the extent to which participants had better knowledge, skills and attitudes than before training. Based on various scholarly views on learning can be summarized that the effectiveness of the training can be measured through learning. In the context of the study, the assessment of learning is measured in terms of improving the knowledge, skills and positive attitude after attending the course. However, between learning and behavior there is another concept known as "training transfer". The concept of transferring training according to Phillips (1991) is the extent to which the behavior learned from the training program is applied in the workplace. Holton et al.

(2001) defines the transfer of work as the extent to which participants apply knowledge, skills and behaviors and attitudes gained from workplace training.
Behaviour refers to the extent to which participants can apply knowledge and skills learned from the training to the job context. Individual behaviour is based on the social cognitive theory which was used by Zimmerman (1990) in his study and it was discovered that learning was a significant factor for enhancing self-efficacy. Based on the social cognitive theory (Bandura 1986), self-efficacy refers to an individual's belief about his or her own capacity to attain success despite having to face challenges. In this study, for participants who have fully digested higher order thinking skills they are able to enhance self-efficacy besides applying the skills for themselves, the organisation, society and the surrounding. Research by (Sukserm & Takahashi 2012; Frayne & Latham, 1987; Gist, 1989; Gist, Schwoerer, & Rosen, 1989) indicated that self-efficacy played a mediating factor in a training transfer model. Sukserm & Takahashi (2012) discovered that self-efficacy was a mediator between learning and ethical behaviour but not much research on this was conducted in the human resource development or training programme aspect. Empirical studies on the link of the three variables (learning, self-efficacy and behaviour) are vital not only for filling in the research gap but also for enhancing the effectiveness of training.

Self-Efficacy as a Mediator

Self-efficacy theory which is an important component of Bandura (1986) is more common than cognitive social theory. Self-efficacy theory suggests individual behaviors, environments and cognitive factors (expectation of results and self-efficacy) are interrelated with each other. Bandura (1978, p. 240) defines self-efficacy as "a person's ability to enforce certain behaviors. Wood and Bandura (1989) developed the definition by suggesting self-efficacy trusts play an important role in regulating processes through motivation and achievement of self-efficacy. Determines how much individual effort will be allocated to an assignment and how long they will survive the task. Individuals with high self-efficacy work diligently to overcome the challenges. On the other hand, individuals with weak self-efficacy have no initiative to overcome the barrier or leave the barrier (Bandura & Schunk 1981;; Schunk 1981). Bandura (1982) concludes that self- efficacy theory considers potential or potential power. His findings suggest that self-efficacy impression helps explain the various behaviors of the individual, including: changes in behavior resulting from the influence of different modes, physiological stress response levels, self-regulation, achievement efforts, internal interest developments and career options.
Self-efficacy is widely applied in various situations and is a predictor of performance and behavior (Bandura 1978, Gist and Mitchell 1992). Observation from various experiments, Bandura (1982, p 61) summarizes that the efficacy of perceptions is often a better predictor of behavior than results or performance. In the study, (Gist 1989, Gist et al. 1989) concluded the empirical evidence supporting the self-efficacy theory is very strong. Self-efficacy theory was found to be appropriate to the study of training transfers in the form of trainees behavior at workplace.

Intrestingly, effective work performance depends on several factors. Among the skills possessed to conduct the behavior correctly (Hinrichs, 1966), how many efforts have been made, the high self-efficacy and the positive that their high beliefs can do (Bandura 1986). Self-efficacy is a mediator of the impact of training programs aimed at improving the effectiveness of employees on performance.
In the context of the study, if the teacher enjoyed HOTs behavior in the classroom, their motivation and belief in their ability (self-efficacy expectation) were higher than those who did not attend training or conventional teaching. Therefore, it is important for organizations in particular Ministry of Education Malaysia or school administrators to study how to improve the self-efficacy of teachers in conducting HOTs behavior to ensure more training transfers occur in the workplace. Hence, the enhancement of HOTs behavior as a goal of the training program can be achieved.

Previous studies revealed that self-efficacy is a mediator between learning and behaviour. However, the role of self-efficacy as a mediator between learning and behaviour mostly in relation to medical psychological issues (Sukserm & Takahashi 2012). Previous study shows that lack of study conducted to investigate self-efficacy mediates the relationship between learning and behaviour in human resource development or training. For example, (Sukserm & Takahashi 2012) found that self-efficacy mediates the relationship between learning and ethical behaviour in corporate social responsibility (CSR) activity in local Thai firms. In medical psychological study, McAuley (1993) concluded self-efficacy as a significant mediator between cognitive learning and behavioral practices in middle-aged adults. Maciejewski et al. (2000) found that self-efficacy mediated the effect of dependent stressful life events and depressive symptoms. While Ott et al. (2000) revealed that self-efficacy is a mediating variable between mastery experience and social persuasion, and adherence to treatment for improving behavior of diabetic people. Li et al. (2002) in his study found that self-efficacy mediates the effects of behavior in elder people between fear of falling and functional ability. Hastings and Brown (2002) found that

self-efficacy mediated the effect of mothers' behavior in terms of anxiety and depression. Kaur et al. (2006) found that self-efficacy mediated the relationship between emotional intelligence and problem gambling. Rimal and Moon (2009) examined the casual relationship between dietary knowledge and behavior by including self-efficacy in the models and found that self-efficacy mediated the effects of dietary knowledge and social influence on dietary behavior. The aim of this study is to investigate the extent to which self-efficacy mediates the relationship between learning and behaviour. This study is expected to fill the gap of study due to lack of research has been conducted to explore the role of self-efficacy in the field of HRD or training.

Methods

This section discusses the research plan, the respondents who participated in the study, the instruments used, the procedures and the analysis of data that was carried out.

Research Design

The study applies the cross sectional method with the main data collection procedure involving literature review, questionnaires and pilot study. The methodology is chosen to allow for accurate, relevant data to be collected in line with the research needs as well as getting reliable data for evaluating respondents' perceptions towards the research (Sekaran & Bougie, 2010). Questionnaire items are constructed based on literature review and adaptation of available instruments. Interviews were conducted with 2 programme developers, 2 lecturers in measurement & evaluation and one personnel involved in teacher training for the higher-order thinking skills among Science teachers. The selection of the instrument evaluation expert was done through purposive sampling to ensure the selected ones have the knowledge and experience in using the higher-order thinking skills training module as well as carrying out the training of those skills among Science teachers. Face and content validity was obtained from expert evaluation. Back-to-back translation was used in translating questionnaires (Malay to English) to ensure instrument validity and reliability (Brislin 1970; Cresswell, 2007; Sekaran & Bougie, 2010).

Respondents

A total of 746 respondents (i.e., science teachers) participated in the study. It has to be noted that the respondents were randomly selected based on the zones, including urban and rural school area.

Analytical Procedures for Analytic Mediators

Hypotheses were analysed using multiple intermediate analysis procedures (Preacher & Hayes, 2008) with PROCESS (Hayes, 2012). The advantages of PROCESS versus other software is PROCESS is a modelling tool that can be used for SPSS and SAS which combines many functions to analyse intermediate and moderator variables. PROCESS, can be obtained free of charge for SPSS and SAS and is able to solve problems regarding behavioural analysis involving mediators, moderators or analytical process otherwise. The advantages of PROCESS is that it combines many well-known procedures (such as INDIRECT, SOBEL, MODPROBE, MODMED, RSQUARE and MBESS) to a simple procedure. Researchers do not need to be familiar with various tools in handling single and simple tasks.

Multiple intermediate analysis procedures (Preacher & Hayes, 2008) enable two or more mediators to be analyzed simultaneously in a simple model. Compared to a simple interstitial model, simultaneous testing has some advantages. First, multiple intermediate analysis enables the determination of unique intermediary effects ie the effects of indirect variables and controlling other intermediaries in the form of covariates. Second, the parameter error can be reduced, making the model more accurate and flexible (Preacher & Hayes, 2008). Multiple integer analysis approach is a nonparametric procedure based on corrected error and bootstrapping is considered to be a reasonable method for analysing multiple integer models. In line with the simple intermediate analysis using a single intermediate variable, the bootstrapping approach offers the best test to get the boot-provide the most powerful test to gain confidence limits for indirect effects (MacKinnon, Lockwood, & Wilson, 2004; Taylor , MacKinnon, & Tein, 2008). The Sobel Test (1982) is also used to ensure alignment with the single integer analysis results.

Learning, Self-efficacy and HOTs Behavior Assessment

A questionnaire using 5-answer scale ranging from "Strongly Disagree"(1) to "Strongly Agree"(5) was used to measure learning (knowledge, skill and attitude) of HOTS (30 items), behaviour (17 items) and on efficacy as a mediator (4 items). Knowledge construct; 'I have the knowledge in planning hands-on Science activities for generating HOTS' (loading factor = 0.664, cronbach alpha = 0.703. Skill construct; 'I am skillful in using various strategies to infuse HOTS in Science subject' (loading factor = 0.724, cronbanch alpha = 0.728. Attitude construct; 'I can infuse HOTS in Science subject despite the large number of students' (loading factor = 0.748, cronbach alpha = 0.881). Behaviour construct; 'I use various strategies to infuse HOTS in teaching Science in the class (loading factor = 0.522, cronbach alpha = 0.897). Self-efficacy construct; 'I have adequate skills to develop students' HOTS' (loading factor = 0.603, cronbach alpha = 0.892).

Results and Findings

Descriptive Statistics and Hypotheses Testing

Table 1 presents descriptive statistics and correlations of all study variables. Preliminary results yielded a significant relationship between the three variables, such as learning (KSA changes) (M= 3.420, SD=0.462), self-efficacy (M= 3.86, SD= 0.534), and behavior (M= 3.63, SD= 0.586). Behavior was significantly and positively related with learning (r= 0.562, $p < 0.01$) and with self-efficacy (r= 0.444, $p < 0.01$). Learning was significantly and positively related with self-efficacy (r= 0.385, $p < 0.01$). Results of the multiple mediation analysis for self-efficacy is shown in Table 2. Figures 1 additionally illustrate the findings. Hypothesis 1, proposing a direct relation between learning and self efficacy (ß = .4434, $p < .001$) was supported. The results of Hypothesis 2 positing specific indirect effects of self-efficacy is displayed in Table 2. Self-efficacy was a statistically significant mediator for learning (ß = .36, $p < .01$) and behavior (ß = 0.5914, $p < .01$), supporting Hypotheses 2 and 3.

Table 1. Mean, standard deviation and correlation between learning, self-efficacy and behaviour

Variable	Mean	Std deviation	1	2	3
Learning	3.42	0.462	**NA**	0.385**	0.562**
Self-efficacy	3.86	0.534	0.385**	NA	0.444**
Behavior	3.63	0.586	0.562**	0.444**	NA

1= Learning, 2 = Self-efficacy (SE), 3 = Behavior
*$p < 0.05$, **$p < 0.001$

Table 2. Mediation results for learning and behavior

Variables	β	b	t	p
Learning Mediator (SE)	0.4434	0.0399	11.1195	0.000
Direct effects of mediator on behavior	0.2974	0.0345	8.6092	0.000
Total effect	0.7232	0.0392	18.4348	0.000
Remaining direct effect	0.5914	0.0404	14.6249	0.000
Indirect effects-bootstrap results	β	b	Cl	p
	0.1319	0.0224	(0.919, 0.1794)	0.000

Indirect effects-product of coefficients results (Sobel)	β	b	Z	p
	0.1319	0.0194	6.7902	0.000

Note. N = 740 of the samples. Confidence intervals are bias controlled and accelerated. Bootstrap resamples = 5,000. Model fit: $R^2 = .6147$, $F(2, 737) = 223,81$, $p < .001$.

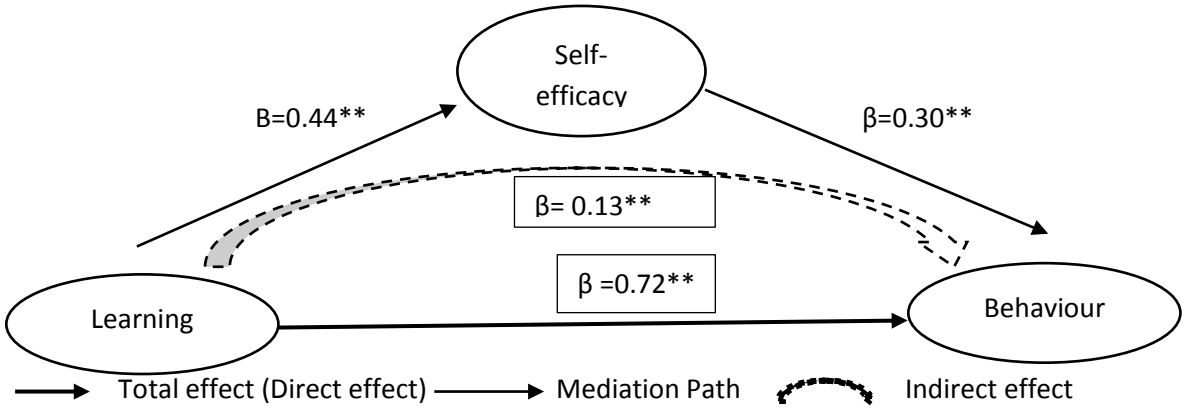

Figure 1 Multiple mediation bootstrap results for behaviour **p < .001.

Regression analysis was used to examine the effects of self-efficacy mediated the effect of the relationship between learning and behavior change. Results showed that learning is a significant predictor to change behavior, β = 0.72, SE = 0.039, p <0.001, and learning is a significant predictor of efficacy, β = 0.44, SE = 0.040 p <0.001. With the inclusion of self-efficacy as mediator, the study still showed a significant predictor of behavior but slightly lower than learning to behavior β = 0.59, SE = 0.034, p <0.001. Due to the inclusion of self-efficacy study still showed a significant predictor and test normal theory shows the effect of intermediate significance (z = 3.1, p <0.001), the efficacy is only part mediate or have an indirect effect on the relationship between learning and behavior. Thus self-efficacy is a partial mediator to conduct β = 0.297, RP = 0.034, p <0.001. Therefore the null hypothesis is rejected.

General Discussion

The purpose of our research was to examine the direct effects of learning as well as the indirect mediating effects in terms of self-efficacy on behavior by using a cross sectional study. By empirically validating hypothesized mediating mechanisms, the research further contributes to a comprehensive learning model. We expected learning to lead to increase behaviour as this relationship is mediated by self-efficacy as a mediating variable. Generally, the findings presented here support our assumptions, which the indirect effect of self-efficacy was significant. Our research was triggered by the fact that even though previous studies revealed direct effects of learning on behavior (e.g., Sukserm & Takahashi 2012; Frayne & Latham, 1987; Gist, 1989; Gist, Schwoerer, & Rosen, 1989), there is sparse research to explain this relationship. In this presentation of our field studies, we provide further evidence that self-efficacy mediates the behavior-outcome relationship, which expands the findings of earlier studies (Gist, 1989; Gist, Schwoerer, & Rosen, 1989; Sukserm & Takahashi 2012) and sheds additional light on the wide-ranging learning picture. These findings can be explained by theoretical considerations, for example, learning (knowledge,skills and attitudes) contribute to the self-efficacy, which in turn leads to increase behavior (Sukserm & Takahashi 2012).

The major finding was that self-efficacy mediates the relationship between learning (KSA change) and HOTS behaviour. This finding was similar to the finding of (Gist and Mitchell 1992; Sukserm and Takahashi 2012). Eventually, self-efficacy encouraged teachers to develop their behaviour. Therefore, self-efficacy played an important role in the relationship between learning (KAS change) and behaviour. The relationship between learning (KSA change) and self-efficacy was positive. From this phenomenon, teachers would have the confidence to believe in terms of implementing teaching and learning strategies that enhance higher order thinking skills. The relationship between learning (KSA changes) and behaviour was positive in the case of teachers who had participated in the in-service teacher training of higher order thinking skills. In this study, we

considered that teachers tended to implement teaching and learning strategies and thinking tools that can enhance higher order thinking. In addition, this finding also showed the positive relationship between self-efficacy and HOTS behaviour. This finding was congruent with the studies of (Benkarn 2005; Sukserm & Takahashi 2012 and Zimmerman 2000). Whenever teachers developed more confidence in their beliefs and/or felt greater confidence in applying strategies and thinking tools after attending in-service training, they would behave finally. Additionally, from this study, the researchers believe that the school principals should support, promote and encourage teachers to participate on actual learning, such kind of HOTs activity, in order to develop confidence.

Conclusion

Our findings expanded the results of previous research and shed additional light on evaluation of learning, behaviour and self-efficacy as a mediator simultaneously. Direct and indirect effects of the relationship between learning and behaviour in a cross-sectional study have been empirically examined and confirmed. This research also presents an added value by demonstrating a simultaneous mediation effect in that specific relationship. Findings underline the importance of self-efficacy mediates the effects of learning on behaviour. The perspective of self-efficacy as a partial mediator in this study promising directions for future research that will increase learning, behaviour and transfer of training.

Recommendation

The empirical evidence on direct and indirect effects of learning also has practical implications. Managers fostering learning to improve behavior must be aware of the underlying motivational processes in terms of self-efficacy in order to introduce effective interventions that optimize behaviour. This means that solely focusing on motivational processes will not result in the largest effect. We suggest that learning can also be performed to specifically identify motivational demands, offering a diagnostic perspective in evaluating learning. Based on our results that self-efficacy explain the positive effects of learning on behaviour, evaluation programs may not only examine changes in the outcomes, but also changes in the underlying motivational processes in the terms of self-efficacy.

In terms of the four-level model, the researchers considered that school principal ought to add “self-efficacy” into the procedure of training and/or activity evaluation. This is fruitful for the in-service teacher training as self-efficacy enables the training company finding belief of each teacher capacity. Thus, after completing evaluation on level 2 (learning), the program evaluator should consider and evaluate self-efficacy as a variable that can influence changing of behaviour. Implication of the implementation of the HOTS activities such as questioning techniques, inquiry, socio scientific issues and thinking maps could be applied in the classroom if teacher have high self-efficacy to implement it even though they faced with the big challenges. The findings in the study also open new perspectives for future research by putting self-efficacy in the context of learning (e.g., Gist and Mitchell 1992; Sukserm and Takahashi 2012). Theoretical justifications suggest that beside self-efficacy as the mediators used in this study, additional intervening variables are also worth examining, such as peer coaching as other potential mediator variable (Jones et al. 2015).

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