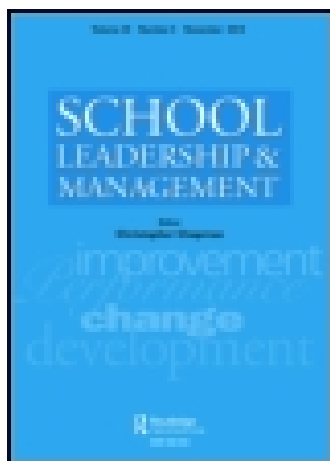


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Teacher change beliefs: validating a scale with structural equation modelling

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Teacher change beliefs: validating a scale with structural equation modelling

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The objectives of the study were to validate a substantiated Teacher Change Beliefs Model (TCBM) and an instrument to identify critical components of teacher change beliefs (TCB) in Malaysian secondary schools. Five different pilot test approaches were applied to ensure the validity and reliability of the instrument. A total of 936 teachers from 47 high-performing secondary schools completed the survey. Structural equation modelling was applied to test the models. Exploratory factor analysis was employed to identify the underlying factors, whereas confirmatory factor analysis was applied to test the measurement models. The analysis yielded a three-factor TCMB: (1) *discrepancy*, (2) *efficacy* and (3) *principal support*. The results demonstrated a good fit of the model: normed $\chi^2 = 3.156$, Tucker-Lewis Fix Index = .987, Comparative Fix Index = .991 and Root Mean Square Error of Approximation = .048. The results also provided evidence for convergent validity, discriminant validity and construct reliability. The TCMB is an empirically tested model derived in a local Malaysian cultural education setting. It provides direction for practitioners in planning and designing training programmes of change management for school principals in the enhancement of TCB among teachers in schools. Besides, Teacher Change Beliefs Scale is a promising and welcome tool for both practitioners and researchers. With only nine items, it is easy to administer and not time-consuming.

Keywords: teacher change beliefs; discrepancy; efficacy; principal support; school reform; structural equation modelling

Introduction

In light of globalisation, educational reform has become a top priority for many countries. The school, as the core cogwheel of education, is subject to inescapable internal and external change pressures (Harris 2006; Holm and Lundström 2011). As the front-line implementers in the change process, teachers are the real source of, and the vehicle for, school change. Numerous studies have revealed that the teacher is the single most important factor in the change process (Fullan 2007; Hall and Hord 2010). They are the closest to the students and are more aware of the needs of the students in the learning process. Hence, they are expected to play an important role in improving quality in schools by establishing an environment that encourages students to learn better in any school change.

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All too often, the main dilemma in any organisational change is whether there is acceptance to change (Hayes 2010). The main reason why organisational change initiatives fail is the resistance to change (Deloitte and Touche 1996); this resistance is always seen as the enemy of change. In other words, change will be ‘doomed’ if there is no buy-in from the change recipients. Likewise, schools are being bombarded by change, and as long as teachers do not buy into the change or put change into practice, school reform will only be adopted on the surface or even fail. Since changes must ultimately be implemented by school teachers, it is essential to understand how teachers make judgements and evaluations towards change – teacher change beliefs (TCB) underlie teacher motives to support or resist change efforts. These will provide very practical insights into how best to lead change in schools.

The Malaysian education system is entering an intensive period of change with the launch of the Malaysia Education Blueprint 2013–2025 in September 2013. In order to equip young Malaysians to succeed in the twenty-first century, the Blueprint suggests 11 strategic and operational shifts for the enhancement of the education system. Specifically, it features universal access all the way through to secondary education, halving the achievement gaps between the rich and poor, urban and rural, produces students who will qualify being in the top third of international student assessments, and provides equal and quality educational opportunities for all students regardless of background (Ministry of Education Malaysia 2013). Obviously, the envisaged reform is complex in both its breadth and depth. Therefore, unless school teachers, the front-line change implementers, possess positive beliefs towards change and be at the heart of the change process, the school reform will fall short of the ambitious aspirations set out in the Blueprint and ultimately fail to live up to the promises.

However, to strengthen positive TCB, we need relevant data and knowledge. Specifically, a reliable and valid model as well as a comprehensive diagnostic instrument to effectively identify and assess critical change beliefs can help teachers to promote and sustain positive attitudes towards change over time. Unfortunately, model or scale development in the organisational science has been deficient (Boyd, Gove, and Hitt 2005). This is particularly true with respect to organisational change (Lengnick-Hall and Beck 2005) and specifically in the Malaysian education context. Sensing the predicament, the main aims of the study were to validate a substantiated Teacher Change Beliefs Model (TCBM) and an instrument to identify critical components of TCB in local context. It serves as a first step on the road to understanding the mechanisms antecedent to the phenomenon of negative attitudes towards change among teachers.

The validation of teacher change beliefs scale

Teacher Change Beliefs Scale (TCBS) in the current study was constructed by adapting organisational change recipient beliefs scale (OCRBS) developed by Armenakis et al. (2007) and readiness for organisational change scale (RFOCS) developed by Holt et al. (2007) which encompasses five main components: (1) *discrepancy*, (2) *appropriateness*, (3) *efficacy*, (4) *principal support* and (e) *valence*. These were the main components of change beliefs included in either practitioner publications or scholarly journals over the past 10 years (2002–2012) as depicted in Table 1. OCRBS (Armenakis et al. 2007) and RFOCS (Holt et al. 2007) have been adapted as their validity evidence supports the construct structure of the instrument. Armenakis et al. (2007) reported that coefficient alphas of .92, .89 and .70, respectively, were achieved on three separate organisational

Table 1. Belief components identified in selected organisational change publications (2002–2012).

Reference	Discrepancy	Appropriateness	Efficacy	Principal supports	Valence
Szamosi and Duxbury (2002)					•
Fugate, Kinicki, and Scheck (2002)				•	
Simons (2002)				•	
Kernan and Hanges (2002)	•	•			
Cunningham et al. (2002)	•		•	•	•
Jimmieson, Terry, and Callan (2004)			•	•	
Jansen (2004)	•	•	•		
Bernerth (2004)	•	•	•	•	•
van Dam (2005)					•
Wolf (2005, May)			•	•	
Fedor, Caldwell, and Herold (2006)					•
Amiot et al. (2006)			•		
Cole (2006)		•			
McGuire and Hutchins (2006)		•	•		
Rafferty and Griffin (2006)		•		•	
Christensen, Marx, and Stevenson (2006)	•	•			•
Bean and Hamilton (2006)	•	•		•	•
Holt et al. (2007)		•	•	•	•
Armenakis et al. (2007)	•	•	•	•	•
Humayun (2008)	•			•	•
Koo (2008)			•	•	
Weiner (2009)			•		•
Pare, Sicotte, and Poba-Nzaou (2010)	•	•	•		
Caporarello and Viachka (2010)			•		•
Seijts and Roberts (2011)			•		
Sarros, Cooper, and Santora (2011)				•	
Majed and Badawi (2012)			•	•	
Basheer and Sulphay (2012)	•	•	•		•

studies for OCRBS. Meanwhile, Holt et al. (2007) reported coefficient alphas of RFOCS were as follows: .94 for *appropriateness*, .87 for *principal support*, .82 for *efficacy* and .66 for *valence*.

Discrepancy (six items) refers to teacher beliefs on whether the need for change is present in the school as there is a gap between the current state and the desired future state (Tai 2013). A discrepancy helps legitimise the need for change (Pare, Sicotte, and Poba-Nzaou 2010) or the motive for a change may be perceived as arbitrary (Armenakis et al. 2007). For Kotter (1999), the first step in creating a sense of urgency in any change is to be able to express the need for change in clear and dramatic terms; if not people will be more

likely to resist it. At school level, the identification of problems and dissatisfaction with the *status quo* will create a sense of urgency; therefore, the school principal will need to communicate and share the vision with the teachers to get buy-in before implementing any school change. According to Levin (2001), if the teachers are not persuaded that change is needed through a justification of a clear change goal, it is unlikely that they will direct their efforts towards school change and the likelihood of embracing change will be relatively low. Indeed, *discrepancy* is one of the valid reasons to resist change as it will affect teachers' cognitive evaluations of the change (Tai 2013).

Appropriateness (seven items) measures whether the proposed change addresses the needs of the school. It is the belief that a correct change reaction is designed to fix the gap identified by discrepancy (Tai 2013). Simply put, teachers believe that the proposed solution is the correct one for the situation at hand. They feel much better about changes being implemented when they believe that the proposed solution is relevant and appropriate. Conversely, although top management perceives the need for change, but the proposed solution is viewed as the incorrect approach to realising the change goal, teachers may refuse to buy-in to the change or attempt to make it work (Tai 2013). Understandably, if they disagree with the proposed change solution, the change will be doomed. As noted by Kernan and Hanges (2002), they might perceive management as being untrustworthy or they might conclude that no change is necessary as management's proposed initiative is inappropriate.

Efficacy (four items) is the belief that the teachers have the necessary skills and ability to cope and make the change succeed (Tai 2013). In the process of change, the more the teachers are confident on his or her knowledge and skills, the greater the chance that the change can be handled more effectively. If they do not possess the required competencies, the likelihood that they will pose resistance against the change is great. Jerald (2007), Eslami and Fatahi (2008) made the point that teachers with a high sense of efficacy tend to be more open to new ideas and are more willing to experiment with new methods that enable them to create new teaching strategies. Likewise, according to Cheung (2008), teachers with a high efficacy make greater efforts to resolve problems when facing challenging situations. Further, teachers with high level of teacher efficacy have been found to be a distinctive and significant predictor of classroom practice in the face of change (Guo et al. 2010).

Principal support (five items) is the belief that school leaders support and are committed to the success of a change and will take optimal steps to face any obstacle (Tai 2013). Top management support is significant in the change process (Sarros, Cooper, and Santora 2011). Teachers are more likely to have positive evaluations of the change when they feel that the school principal properly addressed his or her concerns and committed to a change (Bernerth et al. 2007). Principals can support the change initiative by creating a culture that allows teachers to try out new practices, while making technical and pedagogical support readily available (Somekh 2008). Support from the leadership creates motivation in teachers and they become more committed to their jobs (Hughes and Benigni 2012). In short, school principals need to influence, motivate and inspire teachers through direct and indirect means to accomplish change goals and that they themselves have to commit to the change.

Valence (five items) refers to the belief that the change is beneficial to teachers and can be enjoyed over a period of time (Tai 2013). It clarifies the extrinsic and intrinsic benefits of the change, which can help develop momentum for change (Bernerth 2004). Extrinsic valence refers to the rewards or benefits realised from adopting change, whereas

intrinsic rewards include autonomy for decision-making which is one form of self-actualisation. Teachers seek to know how the change can benefit them and to what extent. The more the teachers find that the change is beneficial and worthwhile, the more they are willing to implement the change and the result is more effective implementation and vice versa. If the change initiative unfairly impacts the teachers, it can lead to feelings of anger and resentment and ultimately display less cooperative behaviour (Tai 2013).

The five key change beliefs discussed above underlie teacher motives to support change efforts and consequently increase the likelihood of successful school change. The researcher adapted the scale items based on the suitability of the item itself and the context of the study. In relation to this, few items for construct *discrepancy* developed by the researchers were added to the scale. Given that the original scale would apply to change in the school settings, some items in the original instrument were rewritten to better fit the contextual richness of the change belief of school teachers involved in the change efforts, as shown in Table 2.

Pilot test approaches

In order to minimise any error or bias and overcome the shortcoming of using one method, five different approaches were applied to ensure the validity and reliability of the instrument in the study. First, the TCBS was peer reviewed by academic colleagues who had undergone the process of survey development and analysis previously as recommended by Netemeyer, Bearden, and Sharma (2003). This was to ensure no irrelevant questions were included in the survey, that precision and clarity was obtained, and that the item arrangement was appropriate for the respondents.

Second, the survey was distributed to a panel of five experts for verification and comments. The purpose of this step was to improve the content validity of the instrument. They were professors or senior lecturers in the area of educational management and leadership, human resource development, educational assessment and evaluation, from five different local universities. They were given the description of the concerned dimensions of the instrument and asked to base their designations on the definitions provided. The content adequacy was measured based on the percentage of inter-rater agreement (Chen, Gully, and Eden 2001). Besides, the expert panel was also requested to provide comments and suggestions concerning the content validity and the appropriateness of the terminology used. Additional items were also encouraged from the panel. Two to three discussions either face-to-face or via phone call were carried out with the five experts, respectively. As all of the items surpassed the threshold of 75% and most probably due to TCBS being adapted from previous researchers, the panel was satisfied with all the items. As a result, no changes were made upon the item content, terminology used, or additional items suggested by the panel. The number of items remained as 27 after the content adequacy test held by the panel.

Third, three personal interviews were conducted with teachers who were similar to those approached in the actual survey (Churchill 1995). There were teachers from three different types of targeted high-performing secondary school (HPSS) in this study: day secondary school (DSS), fully residential secondary school (FRSS) and religious secondary school (RSS). Each school was represented by one teacher who has served at least 10 years in the concerned school. The purpose of the interview was to ask respondents to identify any problems with regards to the questionnaire format, syntax, design, questionnaire completion time and to address any comments or suggestions they

Table 2. The scale item of TCB by dimension.

No.	Variable	Original scale items	Modified items	Reliability	Sources
1.	Discrepancy	a. We need to improve the way we operate	a. This school needs to improve the way of operation in management	Coefficient alphas of .87, .75 and .69, respectively were achieved on three separate organizational studies	Armenakis et al. (2007)
		b. Change is needed to improve our operations	b. Change is needed in this school so as to achieve excellent performance		
		c. We need to improve our effectiveness by changing our operation	c. Change is needed to improve effectiveness in teaching and learning of this school	–	
		d. Action should be taken to identify the weaknesses of management in this school	d. Action should be taken to identify the weaknesses of management in this school	Coefficient alphas of .94 and .80 respectively were achieved on two separate organisational studies	
		e. Change needs to be carried out in this school for the sake of students' interest.	e. Change needs to be carried out in this school for the sake of students' interest.		
		f. The staff of this school need to improve their competency in problem-solving	f. The staff of this school need to improve their competency in problem-solving	–	
2.	Appropriateness	a. It does not make much sense for us to initiate this change	a. Change in this school does not make much sense to me		Holt et al. (2007)
		b. I think that the organisation will benefit from this change	b. I think that this school will benefit from the change		
		c. This change makes my jobs easier	c. Change makes my jobs easier in this school		
		d. This change will improve our organisation's overall efficiency	d. Change will improve my school's overall efficiency		

Table 2 (Continued)

No.	Variable	Original scale items	Modified items	Reliability	Sources
3.	Efficacy	e. When this change is implemented, I do not believe there is anything for me to gain	e. When change is implemented, I believe it will benefit me	Coefficient alphas of .82 and .79, respectively, were achieved on two separate organisational studies	Holt et al. (2007)
		f. There are a number of rational reasons for this change to be made	f. There are a number of rational reasons for change to be made in this school		
		g. In the long run, I feel it will be worthwhile for me if the organisation adopts this change	g. In the long run, I feel it will be worthwhile for me if the school adopts change		
		a. I have the skills that are needed to make this change works	a. I have the skills to make change work in the school		
		b. When we implement this change, I feel I can handle it with ease	b. When we implement change in this school, I feel I can handle it with ease		
4.	Principal support	c. When I set my mind to it, I can learn everything that will be required when this change is adopted	c. When I set my mind to it, I can learn everything that will be required when change is adopted		
		d. My past experiences make me confident that I will be able to perform successfully after this change is made	d. My past experiences make me confident that I will be able to perform successfully after change is made		
		a. Our senior leaders have encouraged all of us to embrace this change	a. Principal has encouraged me to embrace change in this school		

Table 2 (Continued)

No.	Variable	Original scale items	Modified items	Reliability	Sources
		b. Our organisation's top decision-makers have put all their support behind this change effort c. This organisation's most senior leaders are committed to this change d. Every senior manager has stressed the importance of this change	b. Principal has put all his/her support behind change effort in this school c. Principal is committed to the change in this school d. Principal has stressed the importance of the change in this school	Coefficient alphas of .87 and .79 respectively were achieved on 2 separate organisational studies	Holt et al. (2007)
		e. The top leaders in this organisation are "walking the talk"	e. Principal is "walking the talk"	Coefficient alphas of .87, .75 and .69 respectively were achieved on 3 separate organisational studies	Armenakis et al. (2007)
5.	Valence	a. I am worried I will lose some of my status in the organisation when change is implemented b. This change will disrupt many of the personal relationships I have developed c. This change makes it easier for me to feel like I'm part of the organisation d. This change gives me the ability to make decisions about how my work is done e. After this change, I expect to be recognised more for the work I do	a. I am worried I will lose some of my status in this school when change is implemented b. Change in this school will disrupt many of the personal relationships I have developed c. Change makes me feel like I'm part of this school d. Change in this school gives me the ability to make decisions about how my work is done e. After change is implemented, I expect to be recognised more for the work I do	Coefficient alphas of .66 and .65 respectively were achieved on 2 separate organisational studies	Holt et al. (2007)

had. They were interviewed on completion of the questionnaire. The items had been rearranged based on the suggestions given: instead of being presented based on each construct respectively, all items were jumbled up to minimise position bias.

Fourth, the questionnaires had been administered to six teachers to evaluate the clarity of each item (Flowers 2006) by using a scale of 1–10. Teachers from different field of specification were selected as respondents to ensure that the questionnaire could be easily understood by respondents from different backgrounds. The purpose of this step was to determine the validity coefficient for each item and whether the instrument was actually interpreted in the way it was designed to do by the target audience – the sample population. Item with average score obtained equal or above 75% was considered high in content validity (Tuckman and Waheed 1981). As all items yielded a very high score for clarity with at least 8.83 and the average score for the whole instrument was 9.62, no item was dropped after this pilot test.

Fifth, a pilot field-test was performed to assess the internal consistency reliability to evaluate whether the instrument itself is consistent, that is, if respondents answer consistently across all items of a construct (Neuman 2006). Consequently, four items were deleted due to negative item-scale values. There were one from *appropriateness* and three from *valence* (Table 3). These items did not share a common core with the other items of their respective constructs and were therefore dropped. On the other hand, although some of the item-scale value of TCBS were less than .40, and due to the Cronbach's alpha of TCBS being very high, i.e. .90, no deletion was taken upon the concerned items. On the whole, TCB was condensed into 23-item with Cronbach's alpha for five constructs, ranging from .817 to .863 (Table 3).

Table 3. The number of item retained and the Cronbach's alpha for each construct after assessment of internal consistency reliability of TCBS.

Construct	No. of original items	No. of item retained	Cronbach's alpha
Discrepancy	6	6	.863
Appropriateness	7	6	.846
Efficacy	4	4	.854
Principal support	5	5	.817
Valence	5	2	.838
Total	27	23	

Assessment of construct validity through exploratory factor analysis

A second pilot field-test was carried out to perform exploratory factor analysis (EFA) to verify the conceptualisation on the constructs and its dimensions of TCBS. EFA was conducted based on the second pre-test responses with 587 teachers from eight different states of West Malaysia chosen randomly as sample. It was double the number of the minimal requirement for factor analysis, i.e. 10 times of the total number of items identified (23 items \times 10 = 230) (Hair et al. 2009).

The suitability of data was assessed prior to performing EFA. The correlation matrix of the 23 items revealed the presence of many coefficients of .4 and above. The communalities with all values exceeding .5 indicated that the sample size was adequate (Hair et al. 2009). The Kaiser–Meyer–Oklin value was .939, exceeding the recommended

value of .6 as the minimum value for a good factor analysis (Kaiser 1970, 1974). The Bartlett's test of sphericity was below the significance level, i.e. $p < .05$, which indicated that sufficient correlations exist among the item (Hair et al. 2009) and thus the overall inter correlations were met.

Principal component analysis (PCA) revealed the presence of four factors with eigenvalues exceeding 1, explaining 51.1%, 7.7%, 6.9% and 4.5% of the variance, respectively, or a total of 70.18% of the variance (Table 4). In identifying the extraction factors by eigenvalues, a scree plot test was applied on the data set. It was noticed that there were three changes (or elbow) in the shape of the plot (Figure 1). In other words, it can be two, three or four extracted factors. Depending on the research context, it was decided that there were three extracted factors. The upper three main factors contributed the most to the explanation of the variance, whereas the fourth factor captured only 4.5% (Table 4) or less than 5% of the variance; thus this should not be retained for further investigation.

Following this, the rotated solution revealed that the three factors explained a total of 65.73% of the variance (Table 5), which were above the threshold of 50% suggested by Streiner (1994). Factor 1 contributing 28.54%, Factor 2 contributing 27.94% and Factor 3 contributing 9.25%. Table 6 demonstrates that all three factors showed a number of strong loadings from .502 to .836 which displayed high variance among the variables. Indeed, 17 items of the three factors were more than .5, while five items were less than .5 (Items 8, 11, 13, 3 and 1 with no value). Item 19 did not load correctly on its construct, rather it cross-loaded with other items. All items less than .5 and the cross-loading item were deleted.

Further, the rotated component matrix (Table 6) revealed that, Factor 1, contained five items, termed *discrepancy*, comprised items that were initially classified as *discrepancy*; Factor 2 consisted six items, termed *efficacy*, encompassed four items that were initially classified as *efficacy*, one item from *appropriateness* (E15: *Change makes my job easier in this school*), and one item from *valence* (E16: *Change in this school gives me the ability to make decisions about how my work is done*) (Table 7); and Factor 3, contained six items, termed *principal support*, comprised five items which were initially classified as *principal support* and one item from *appropriateness* (E22: *I think that this school will benefit from the change*) (Table 7). Obviously, two factors, the *appropriateness* and *valence*, from the original five-factor adapted instrument of OCRBS (Armenakis et al. 2007) and RFOCS (Holt et al. 2007) were excluded in the data set due to the unique local context after applying EFA. On the whole, out of 23 items, three factors with 17 items were retained for TCBS. Finally, each loaded factor was assessed by Cronbach's alpha measure. Table 7 displays the related 17 items, its initial construct before PCA, the factor loading and Cronbach's alpha value for each factor. Obviously, all items of the three factors were over the recommended acceptance levels, i.e. with factor loading more than .5 (Field 2005) and Cronbach's alpha value was at least 0.7 (Hair et al. 2009). Table 8 summarised all the retained items of TCBS from content adequacy test to PCA and the selected items for final survey.

Population and sample

The study population comprised 13,900 HPSS teachers in Malaysia. HPSS and the concerned teachers were the sites and study population chosen for the study as they are 'information rich' and of central importance to the purpose of the study (Patton 2002). As planned changes are intentional acts designed to disrupt the *status quo* and move the organisation towards a more effective state (Hayes 2010), the probability of HPSS

Table 4. Total variance explained of TCBS (1).

Component	Initial Eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	% of variance	Cumulative (%)	Total	% of variance	Cumulative (%)	Total	% of variance	Cumulative (%)
1	11.751	51.091	51.091	11.751	51.091	51.091	6.708	29.166	29.166
2	1.771	7.701	58.792	1.771	7.701	58.792	5.658	24.599	53.764
3	1.595	6.936	65.728	1.595	6.936	65.728	2.090	9.085	62.849
4	1.024	4.451	70.179	1.024	4.451	70.179	1.686	7.329	70.179
5	.806	3.503	73.682						
6	.690	2.999	76.681						
7	.550	2.393	79.074						
8	.525	2.283	81.357						
9	.459	1.994	83.351						
10	.425	1.849	85.200						
11	.419	1.824	87.024						
12	.374	1.627	88.651						
13	.350	1.523	90.173						
14	.315	1.370	91.543						
15	.309	1.343	92.886						
16	.285	1.240	94.126						
17	.277	1.204	95.329						
18	.249	1.083	96.413						
19	.220	.955	97.368						
20	.212	.921	98.289						
21	.189	.821	99.110						
22	.160	.696	99.806						
23	.045	.194	100.000						

Note: Extraction method: PCA.

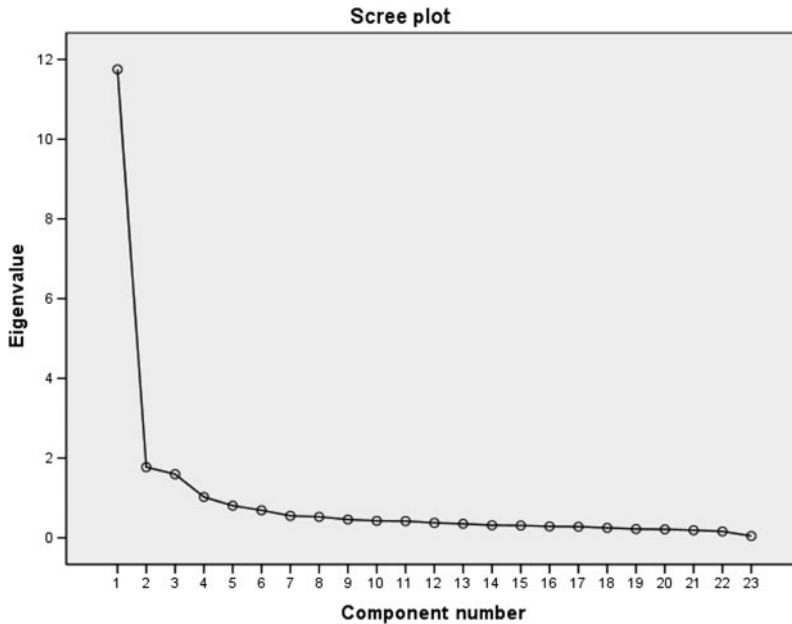


Figure 1. Scree plot of TCBS.

principals leading change is far higher than principals in mediocre or low-performing schools. As a result, teachers in HPSS experienced school change more often than their counterparts in mediocre or low-performing schools. Hence, by focusing on HPSS, the researchers can more accurately evaluate the critical components of TCB.

Multiple-staged stratified random sampling procedure was used in this study. Basically, there were three strata in the study population, namely DSS, FRSS and RSS. Among 186 HPSS in Malaysia, there were 80 DSS, 60 FRSS and 46 RSS. The researcher decided to extract 25% of each stratum of the target population, and as a result 20 DSS, 15 FRSS and 12 RSS or a total of 47 HPSS were selected randomly through the proportionate stratification procedure for the survey.

Next, the proportionate stratification procedure was applied again to stratify the HPSS in each state, respectively. This sampling technique gives all the three strata in each state equal chances of being selected. After the stratification of school is made, then the sample was identified. With 47 schools identified, 20 respondents or teachers from each school were chosen as the sample by using the simple sampling method based on the official list of teachers provided by the State Education Departments, respectively. As a result, 400 teachers were selected to represent DSS, 300 for FRSS and 240 for RSS. Overall, a total number of 940 respondents were identified for the survey where this represents 33% of the total number of teacher in 47 HPSS ($N = 2863$). Importantly, it meets the basic requirement of evaluating the overall fit of the hypothesised models using structural equation modelling (SEM) analysis (Chua 2009; Kline 2005). The number of respondents for each stratum in each state is described in Table 9.

Table 5. Total variance explained of TCBS (2).

Component	Initial Eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	% of variance	Cumulative (%)	Total	% of variance	Cumulative (%)	Total	% of variance	Cumulative (%)
1	11.751	51.091	51.091	11.751	51.091	51.091	6.564	28.540	28.540
2	1.771	7.701	58.792	1.771	7.701	58.792	6.425	27.935	56.475
3	1.595	6.936	65.728	1.595	6.936	65.728	2.128	9.253	65.728
4	1.024	4.451	70.179	1.024	4.451	70.179	1.686	7.329	70.179
5	.806	3.503	73.682						
6	.690	2.999	76.681						
7	.550	2.393	79.074						
8	.525	2.283	81.357						
9	.459	1.994	83.351						
10	.425	1.849	85.200						
11	.419	1.824	87.024						
12	.374	1.627	88.651						
13	.350	1.523	90.173						
14	.315	1.370	91.543						
15	.309	1.343	92.886						
16	.285	1.240	94.126						
17	.277	1.204	95.329						
18	.249	1.083	96.413						
19	.220	.955	97.368						
20	.212	.921	98.289						
21	.189	.821	99.110						
22	.160	.696	99.806						
23	.045	.194	100.000						

Note: Extraction method: PCA.

Table 6. Rotated component matrix^a of TCBS.

	Component		
	1	2	3
E5	.823		
E7	.818		
E6	.808		
E10	.787		
E23	.750		
E19	.564	.540	
E8			
E11			
E18		.836	
E17		.826	
E16		.723	
E14		.714	
E12		.634	
E15		.626	
E4			.812
E2			.753
E9			.704
E21			.676
E20			.513
E22			.502
E13			
E3			
E1			

Note: Extraction method: PCA. Rotation method: Varimax with Kaiser normalisation.

^aRotation converged in five iterations.

Questionnaire design and survey administration

The main content of the questionnaire consisted of two major parts (Part I and Part II). Part I contained demographic information such as gender, age, academic qualification, type of school and location of school. Part II consisted of scale items for TCBS. The instrument was a 6-point Likert scale. Respondents were asked to rank their responses from 'strongly disagree' to 'strongly agree'. Scoring was accomplished by assigning 1 to 'strongly disagree', 2 to 'disagree', 3 to 'moderately disagree', 4 to 'moderately agree', 5 to 'agree' and 6 to 'strongly agree'.

Of 940 sets of questionnaires sent out via post, a total of 938 sets were returned, with a response rate of 99.78%. Two sets of questionnaires had more than 25% obvious errors and illegible responses and were thus excluded from further analysis. Finally, a total of 936 sets of questionnaires were retained for the final analysis. The statistical analyses undertaken in this study comprised descriptive (percentage data) as well as multivariate analysis with SEM.

Table 7. Selected items of TCBS for final survey, its initial construct, factor loading and Cronbach's alpha.

Construct	Item code (PCA)	Item code (CFA)	Item	Initial construct before PCA	Factor loading	Cronbach's alpha
Discrepancy	E5	DIS1	Change is needed in this school so as to achieve excellent performance	DIS	.823	.918
	E7	DIS3	Change is needed to improve effectiveness in teaching and learning of this School	DIS	.818	
	E6	DIS2	This school needs to improve the way of operation in management	DIS	.808	
	E10	DIS5	Action should be taken to identify the weaknesses of management in this School	DIS	.787	
	E23	DIS4	Change needs to be carried out in this school for the sake of students' interest	DIS	.750	
Efficacy	E18	EFF1	When we implement this change, I feel I can handle it with ease	EFF	.836	.915
	E17	EFF6	I have the skills that are needed to make this change works	EFF	.826	
	E16	EFF5	Change in this school gives me the ability to make decisions about how my work is done	VAL	.723	
	E14	EFF2	When I set my mind to it, I can learn everything that will be required when this change is adopted	EFF	.714	
	E12	EFF3	My past experiences make me confident that I will be able to perform successfully after this change is made	EFF	.634	
Principal support	E15	EFF4	Change makes my jobs easier in this school	APP	.626	.837
	E4	PS4	Principal is "walking the talk"	PS	.812	
	E2	PS2	Principal has encouraged me to embrace change in this school	PS	.753	
	E9	PS5	Principal is committed to the change in this school	PS	.704	
	E21	PS6	Principal has stressed the importance of the change in this school	PS	.676	
	E20	PS3	Principal has put all his/her support behind change effort in this school	PS	.513	
	E22	PS1	I think that this school will benefit from the change	APP	.502	

PCA, principal component analysis; CFA, confirmatory factor analysis; DIS, discrepancy; EFF, efficacy; VAL, valence; APP, appropriateness; PS, principal support.

Table 8. Retained items for TCBS from content adequacy test to PCA and selected items for final survey.

No.	Construct	Item code	After content adequacy test	After assessment of internal consistency reliability	After PCA	Selected items for final survey
1.	Discrepancy (DIS)	E5	Change is needed in this school so as to achieve excellent performance	•	•	•
		E7	Change is needed to improve effectiveness in teaching and learning of this school	•	•	•
		E6	This school needs to improve the way of operation in management	•	•	•
		E10	Action should be taken to identify the weaknesses of management in this school	•	•	•
		E23	Change need to be carried out in this school for the sake of students' interest	•	•	•
		E11	The staff of this school need to improve their competency in problem-solving	•		
2.	Appropriateness (APP)	E26	Change in this school does not make much sense to me			
		E22	I think that this school will benefit from the change	•	•	•
		E15	Change makes my jobs easier in this school	•	•	•
		E19	Change will improve my school's overall efficiency	•		
		E25	When change is implemented, I believe it will benefit me	•		
		E1	There are a number of rational reasons for change to be made in this school	•		
3.	Efficacy (EFF)	E8	In the long run, I feel it will be worthwhile for me if the school adopts change	•		
		E17	I have the skills that are needed to make this change works	•	•	•
		E18	When we implement this change I feel I can handle it with ease	•	•	•
		E12	My past experiences make me confident that I will be able to perform successfully after this change is made	•	•	•

Table 8 (Continued)

No.	Construct	Item code	After content adequacy test	After assessment of internal consistency reliability	After PCA	Selected items for final survey
4.	Principal support (PS)	E14	When I set my mind to it, I can learn everything that will be required when this change is adopted	•	•	•
		E2	Principal has encouraged me to embrace change in this school	•	•	•
		E20	Principal has put all his/her support behind change effort in this school	•	•	•
		E9	Principal is committed to the change in this school	•	•	•
		E21	Principal has stressed the importance of the change in this school	•	•	•
5.	Valence (VAL)	E4	Principal is "walking the talk"	•	•	•
		E13	I am worried I will lose some of my status in this school when change is implemented			
		E24	Change in this school will disrupt many of the personal relationships I have developed			
		E3	Change makes me feel like I'm part of this school	•		
		E16	Change in this school gives me the ability to make decisions about how my work is done	•	•	•
		E27	After change is implemented, I expect to be recognised more for the work I do			
Total			27	23	17	17

PCA, principal component analysis.

Table 9. Total number of schools and respondents involved in the survey for each state based on proportional stratification.

State	DSS			FRSS			RSS			Total		
	ANS	NSS	NR	ANS	NSS	NR	ANS	NSS	NR	ANS	NSS	NR
Pahang	11	3	60	6	2	40	2	0	0	19	5	100
Johor	15	4	80	6	1	20	4	1	20	25	6	120
Selangor	9	2	40	6	1	20	8	2	40	23	5	100
Penang	9	2	40	2	1	20	3	1	20	14	4	80
Sarawak	0	0	0	4	1	20	0	0	0	4	1	20
Kelantan	5	1	20	5	1	20	6	2	40	16	4	80
N.Sembilan	3	1	20	5	1	20	3	1	20	11	3	60
Perak	6	1	20	6	2	40	3	1	20	15	4	80
Kedah	7	2	40	6	1	20	4	1	20	17	4	80
Sabah	0	0	0	2	1	20	0	0	0	2	1	20
Perlis	2	1	20	1	0	0	1	0	0	4	1	20
K.Lumpur	6	1	20	5	1	20	1	0	0	12	2	40
Melaka	2	1	20	2	1	20	1	0	0	5	2	40
Trengganu	5	1	20	4	1	20	10	3	60	19	5	100
Total	80	20	400	60	15	300	46	12	240	186	47	940

ANS, actual number of schools; NSS, number of schools for survey; NR, number of respondents.

Demographic characteristics

The analysis of the final sample profile showed a higher number of female respondents ($N = 705$, 75.3%) than males ($N = 231$, 24.7%). Respondents between the ages of 41 and 50 years ($N = 337$, 36%) formed the largest group of respondents in the survey. This was followed by those in the age groups of 31–40 years ($N = 319$, 34.1%), 21–30 years ($N = 157$, 16.8%) and 51–60 years ($N = 122$, 13%). In terms of educational qualifications, the majority of the respondents had Bachelor's degree ($N = 828$, 88.5%), followed by respondents with Master's degree ($N = 80$, 8.5%), certificate or diploma ($N = 27$, 2.9%) and only one respondent had a PhD degree ($N = 1$, .1%). Demographic details of the respondents also showed that approximately half of the respondents were from DSS ($N = 456$, 48.7%). About 27.9% ($N = 261$) and 23.4% ($N = 219$) were from FRS and RSS, respectively. On top of this, 71.6% ($N = 670$) of them were from urban schools, whereas a further 28.4% ($N = 266$) were from rural schools.

Assessment of measurement model through confirmatory factor analysis

The measurement model of TCB was constructed as shown in Figure 2. This model consisted of three latent variables, *discrepancy* (DIS), *efficacy* (EFF) and *principal support* (PS). DIS was measured by five observed variables, whereas EFF and PS were measured by six observable variables, respectively. Confirmatory factor analysis (CFA) was applied to test the adequacy of the model. The Tucker-Lewis Fix Index (TLI) (.916) and Comparative Fix Index (CFI) (.928) fit indicators exceeded the threshold of .90, indicating a good fit. However, the normed χ^2 was 8.257, exceeded the .50 suggested cut-off value and thus suggested unacceptable fit for the CFA model. The Root Mean Square Error of Approximation (RMSEA) with a value of .088 was problematic too because it

$\chi^2 = 957.820$
 df = 116
 p = .000
 normed $\chi^2 = 8.257$
 TLI = .916
 CFI = .928
 RMSEA = .088

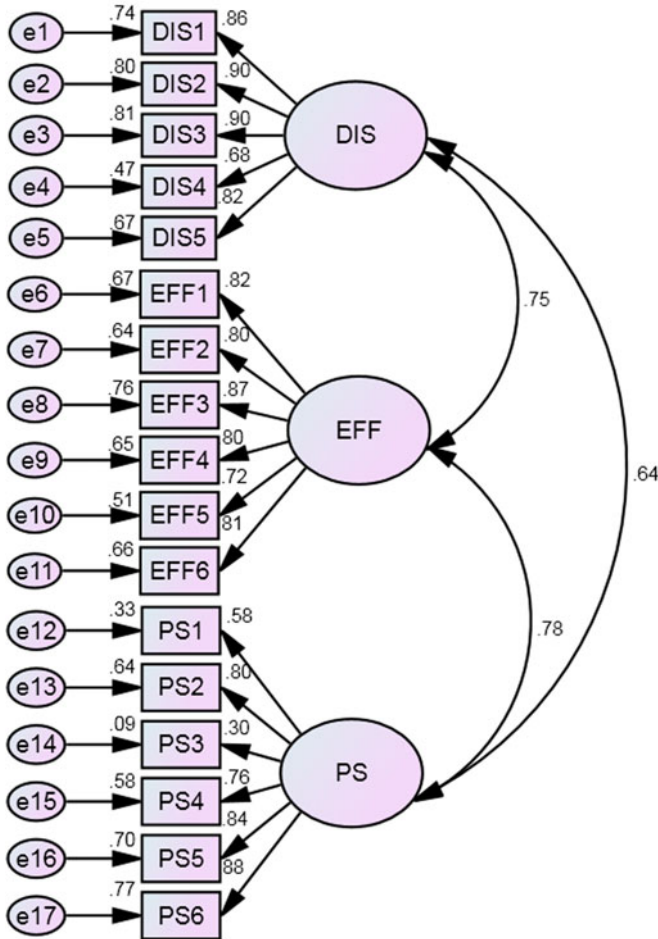


Figure 2. TCB measurement Model 1.
 Note: DIS, discrepancy; EFF, efficacy; PS, principal support.

surpassed the suggested .06 acceptance level. To further identify the cause of the misfit, the modification indices (MI) were scrutinised.

Among the item pairs with high MI values were EFF1 and EFF6 (72.448, 70.329) (Table 10). EFF1 (*When we implement this change, I feel I can handle it with ease*) and EFF6 (*I have the skills that are needed to make this change work*) (Table 7) seemed to have some degree of redundancy and the researcher decided to delete EFF1 because the statement of EFF6 was comparatively more direct and with high certainty (*I have the skills* compared with *I feel I can handle*).

Table 10. Text output for hypothesised measurement model of TCB: modification indexes (1).

			M.I.	Par change
PS1	↑	EFF	11.308	.117
PS1	↑	PS2	15.858	.109
PS1	↑	PS3	13.514	.079
PS1	↑	DIS4	16.022	.107
PS1	↑	EFF2	21.442	.116
PS1	↑	EFF4	10.893	.094
PS1	↑	EFF6	22.656	.129
PS2	↑	PS1	33.257	.122
PS4	↑	EFF	10.590	-.104
PS4	↑	PS3	10.079	.063
PS4	↑	DIS4	14.717	-.094
PS4	↑	EFF2	16.003	-.092
PS4	↑	EFF3	13.682	-.090
PS4	↑	EFF4	16.692	-.108
PS5	↑	PS1	12.760	-.077
PS5	↑	PS3	12.350	-.060
PS6	↑	PS1	24.515	-.097
PS6	↑	PS3	10.610	-.050
PS6	↑	EFF3	17.555	.080
DIS1	↑	EFF3	11.443	-.063
DIS4	↑	DIS5	14.255	.094
DIS5	↑	PS5	13.059	.067
DIS5	↑	DIS4	24.791	.098
DIS5	↑	EFF2	17.868	.078
EFF1	↑	EFF6	72.448	.184
EFF2	↑	PS1	11.434	.078
EFF2	↑	DIS5	19.800	.101
EFF2	↑	EFF5	11.036	-.070
EFF3	↑	PS6	15.402	.068
EFF4	↑	DIS	13.971	.093
EFF4	↑	DIS2	15.364	.078
EFF4	↑	DIS3	16.413	.079
EFF4	↑	DIS5	10.728	.065
EFF6	↑	EFF1	70.329	.162

Note: The bold values of the Modification Indexes (M.I.) are the problematic indicator variables. The greater the value of a Modification Index, the more the overall fit of the model could improve. The Par Change represented the expected predicted change.

Next, PS1 (*I think this school will benefit from the change*) (Table 7) was problematic because it appeared four times with other items for having moderate MIs: PS2 and PS1 (33.257), PS6 and PS1 (24.515), PS1 and EFF6 (22.656), PS1 and EFF2 (21.442) (Table 10). In fact, initially it was from the construct of *appropriateness* in the original measure (Table 7). Another offending item was DIS5 (*Action should be taken to identify the weaknesses of management in this school*) (Table 7). It appeared twice with other items with moderate MIs: DIS4 (24.791), and EFF2 and DIS5 (19.800) (Table 10). Thus, it also became another candidate for deletion.

The model was revised and the modified model was presented in Figure 3. Obviously, after the elimination of the above-mentioned three items (EFF1, PS1 and DIS5), the

$\chi^2 = 368.528$
 df = 74
 p = .000
 normed $\chi^2 = 4.980$
 TLI = .960
 CFI = .967
 RMSEA = .065

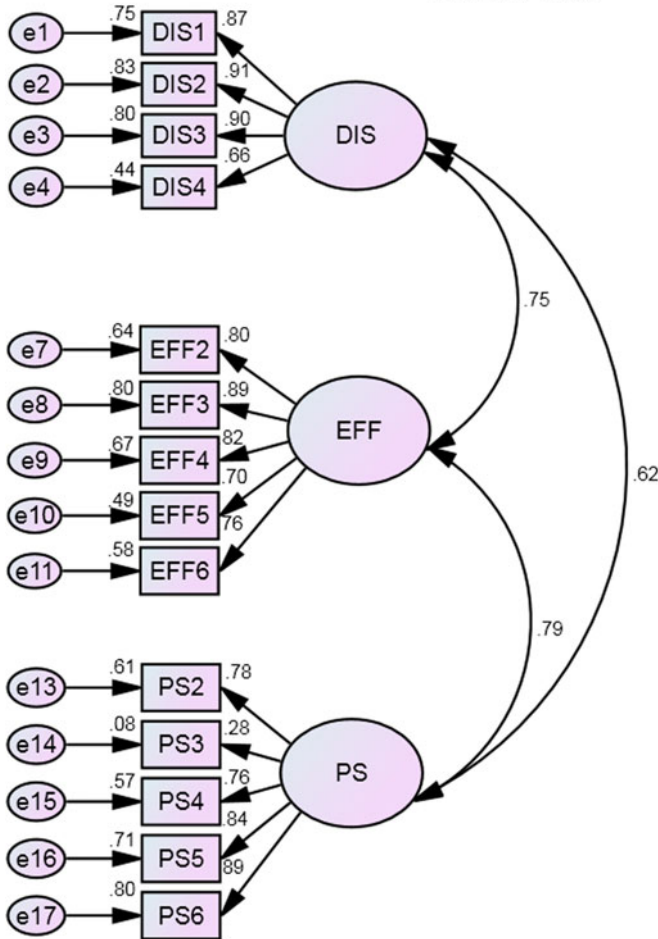


Figure 3. TCB measurement Model 2.
 Note: DIS, discrepancy; EFF, efficacy; PS, principal support.

discrepancies declined and better model fit to the sample data was established. The normed χ^2 with a value of 4.980, successfully met the required threshold of <5. The TLI (.960) and CFI (.967) increased .044 and .039, respectively, indicating a very good fit. However, the RMSEA (.065) was yet below the suggested threshold (<.060) and thus did not reach the acceptable level. Hence, the model had to be modified and it indeed deserved attention as the other diagnostics indicated problems.

Given the suggestions of the MIs as shown in Table 11, the item pair which had the highest MI value was EFF6 and EFF5 (22.523, 17.916). Comparatively, as EFF5

Table 11. Text output for hypothesised measurement model of TCB: modification indexes (2).

			M.I.	Par change
PS2	←	PS3	11.411	.058
PS4	←	PS3	13.555	.073
PS4	←	DIS4	11.107	-.082
PS4	←	EFF2	12.400	-.082
PS4	←	EFF3	12.619	-.087
PS4	←	EFF4	14.153	-.100
PS6	←	EFF3	14.331	.070
DIS1	←	EFF3	10.853	-.061
EFF5	←	EFF6	17.916	.111
EFF6	←	EFF5	22.523	.098

Note: The bold values of the Modification Indexes (M.I.) are the problematic indicator variables. The greater the value of a Modification Index, the more the overall fit of the model could improve. The Par Change represented the expected predicted change.

(Change in this school gives me the ability to make decisions about how my work is done) originated from the construct of *valence* in the original instrument (Table 7), EFF6 (*I have the skills that are needed to make this change work*) (Table 7) seemed more suitable to be retained and hence, EFF5 was discarded. Another problematic item was PS4 (*Principal is 'walking the talk'*) (Table 7). It deserved to be eliminated as it appeared twice, with EFF4 (14.153) and PS3 (13.555) (Table 11) for having high MI values.

After the deletion of EFF5 and PS4, all fit statistics were well within acceptable values (Figure 4). The normed χ^2 with a value of 3.522, indicating a good fit. The TLI (.978) and CFI (.983) improved again, indicating a very good fit. The RMSEA (.052) successfully met the set threshold of .06 and thus indicated an acceptable model fit.

At this point, although the model fit did not suggest a great need for further improvement, by inspecting the correlation matrix, multicollinearity was detected because factor loadings among some variables were high, i.e. more than .85 (Figure 4), for example, DIS2 (.91), DIS3 (.90), EFF3 (.90) and PS6 (.91). On the contrary, PS3 (.27) was very low in factor loading. Abiding by the three-indicator rule, the researcher only can delete one item from each construct so as to maintain the statistical significance of all parameter estimates. For construct DIS, in order to lighten the problem of multicollinearity (DIS2 and DIS3), DIS4 (.66) was deleted, whereas for construct EFF, EFF3 was discarded. For construct PS, PS3 was dropped due to its low loading.

Following this, a better model fit to the sample data was established (Figure 5). The normed $\chi^2 = 3.156$, TLI = .987, CLI = .991 and the RMSEA = .048. Obviously, this was a very good fit model with all fit statistics well above the set threshold. In sum, the model fit statistics suggested that the estimated model that reproduces the sample covariance matrix was reasonably accurate.

On top of evaluating goodness-of-fit statistics, the next diagnostic measure was the standardised residuals. According to Hair et al. (2009), the better the fit, the smaller are the residuals. Table 12 summarised the standardised residuals of the TCB model. Obviously, all residuals were less than the minimum threshold of 2.5 (Hair et al. 2009). This result again confirmed that the TCBM was free from offending estimates and the three constructs were measured by the items reasonably well.

$\chi^2 = 179.599$
 df = 51
 p = .000
 normed $\chi^2 = 3.522$
 TLI = .978
 CFI = .983
 RMSEA = .052

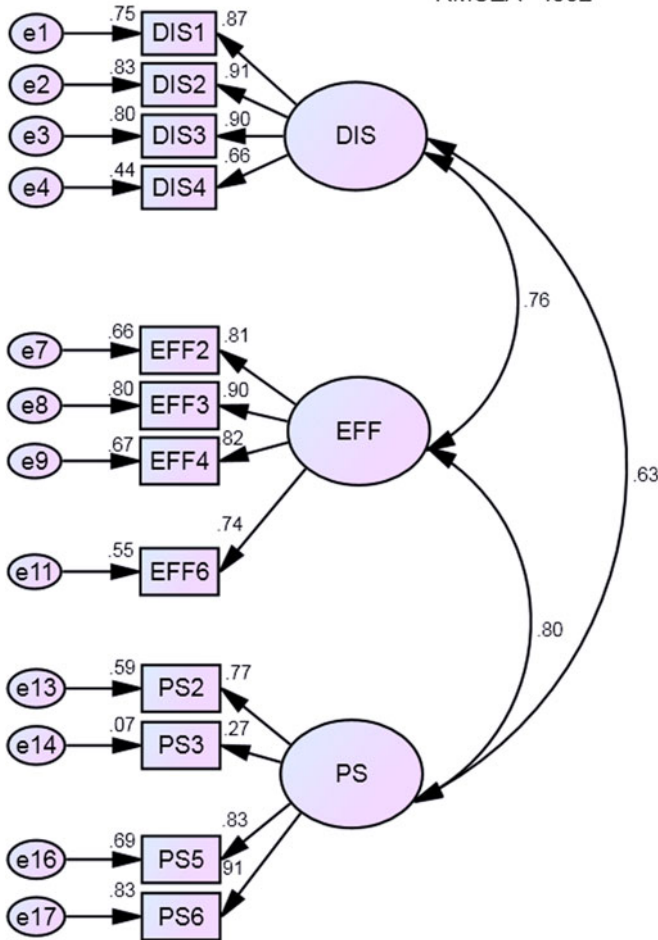


Figure 4. TCB measurement Model 3.
 Note: DIS, discrepancy; EFF, efficacy; PS, principal support.

TCB as a second-order construct

After yielding a very good fit TCB measurement model, a second-order CFA was conducted. In Figure 6, it was confirmed that the normed χ^2 met the required threshold of <5 with a value of 3.156, indicating a very good fit. The TLI (.987) and CFI (.991) fit indicators exceeded the guidelines of greater than .90, indicating a very good fit too. The RMSEA provided additional support for model fit with a value of .048. As the model was free from offending estimates, thus it was accepted and this reaffirmed that the three-factor second-order TCBM fits the data well.

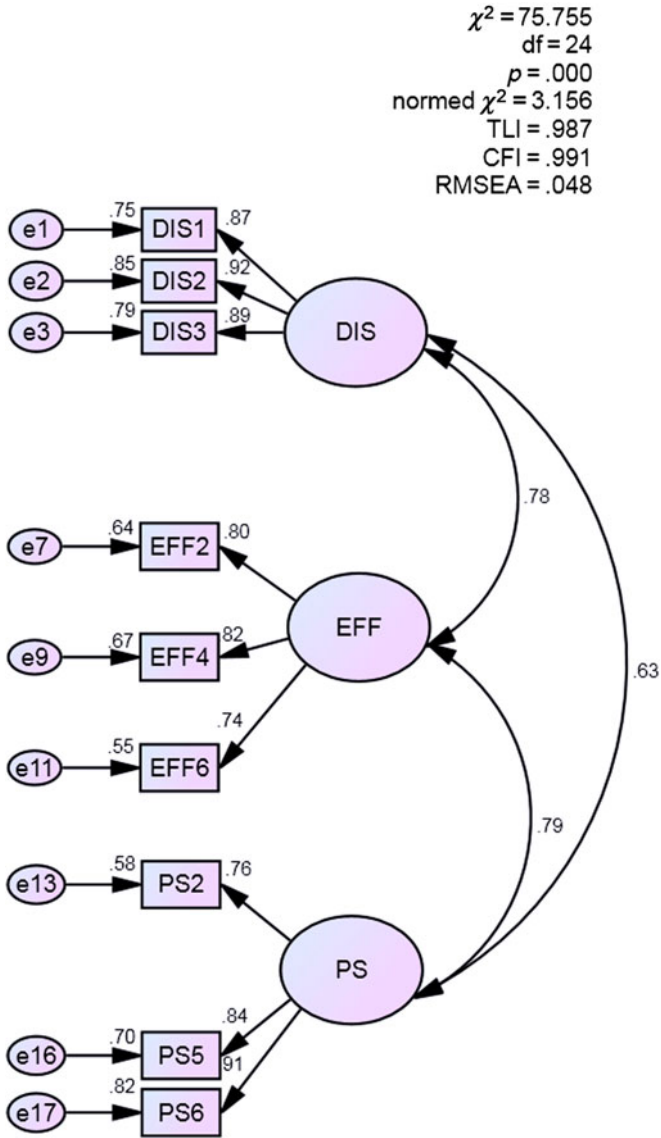


Figure 5. TCB measurement Model 4.
 Note: DIS, discrepancy; EFF, efficacy; PS, principal support.

Convergent validity

To assess the convergent validity, the researchers examined the standardised factor loading (SFL) estimates as shown in Table 13. Obviously, all the items satisfied the cut-off value of .70, ranging from .74 to .91. This indicated that all the critical ratios of the estimates were outside the ± 1.96 z value range and p value was below .05; thus, factor loadings were statistically significant (Holmes-Smith 2001). Furthermore, the square multiple correlations (SMC) was also examined to assess convergent validity. Likewise, all items did not go against estimation rule with threshold more than .50. Finally, the

Table 12. Standardised residual covariances of TCBS.

	PS2	PS5	PS6	DIS1	DIS2	DIS3	EFF2	EFF4	EFF6
PS2	.000								
PS5	-.089	.000							
PS6	-.156	.129	.000						
DIS1	.693	-.753	-.914	.000					
DIS2	.405	.189	-.128	.267	.000				
DIS3	.959	.665	.056	-.091	-.171	.000			
EFF2	.788	-.506	.417	-.614	-.270	1.111	.000		
EFF4	.086	-.353	-.233	-.331	.532	1.503	-.506	.000	
EFF6	1.035	-.367	-.130	-1.795	-1.212	-.144	.485	.279	.000

researchers examined the construct reliability of TCBS. High composite reliability index (CRI) indicates that internal consistency exists, which means that the measures all consistently represent the same latent construct (Hair et al. 2009). The results shown in Table 13 confirmed that constructs of DIS (.82) and PS (.74) exceeded 0.70 rule of thumb (Hair et al. 2009), whereas EFF (.68) approached the suggestion standard (.70). In short, as a whole, all statistics indices exhibited good values and free from offending estimates. These indicated that the TCBS provided evidence of convergent validity. Thus, all three constructs with three items, respectively, were retained. Table 14 summarised the assessments of the convergent validity for the TCBM.

Discriminant validity

Discriminant validity presented in Table 15 was calculated by comparing the average variance extracted (AVE) and its shared variance between the constructs (Hair et al. 2009; Holmes-Smith 2001). The results confirmed that all AVE estimates were found greater than or equal to the corresponding inter-construct squared correlation estimates. This indicated that the structures of the factors were distinctive and the construct of TCB thus featured good discriminant validity.

Discussion

In testing TCBM, after identifying the underlying structure based on local context, instead of five factors: *discrepancy*, *appropriateness*, *efficacy*, *valence* and *principal support*, only three factors were retained namely, *discrepancy* (.79), *efficacy* (.99) and *principal support* (.80) (Figure 6) and the identified TCBS with nine items is depicted in Table 16.

The findings which revealed that *discrepancy* is one of the important factors of TCB is in line with Pare, Sicotte, and Poba-Nzaou's (2010) explanation that a discrepancy helps legitimise the need for change. The findings are also consistent with the observation of Kotter (1999) that to create a sense of urgency in any change, the first step is to express the need for change clearly. The findings are also congruent with the results of the studies conducted by Levin (2001) that if teachers are not persuaded that change is needed, it is unlikely that they will direct their efforts towards school change. In other words, teacher awareness of the change is critical. Therefore, it is the responsibility of school principals

$\chi^2 = 75.755$
 $df = 24$
 $p = .000$
 normed $\chi^2 = 3.156$
 $TLI = .987$
 $CFI = .991$
 $RMSEA = .048$

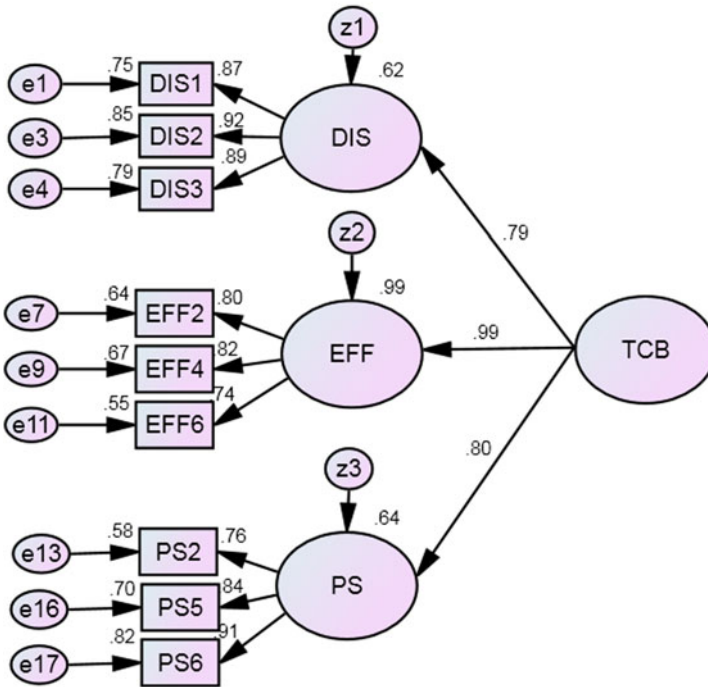


Figure 6. TCB second-order measurement model.
 Note: TCB, teachers' change beliefs; DIS, discrepancy; EFF, efficacy; PS, principal support.

to present change initiatives through recognising the need for change so as to shape teacher responses and beliefs.

The findings also reinforced the point made by Armenakis et al. (2007) that if organisational members are not persuaded change is needed, the motive for a change may be perceived as arbitrary. Understandably, if teachers can see by themselves the need to change, rather than school principals attempting to sell them the need to change, the likelihood for teachers embracing change will be relatively high. School principals can enable teachers aware of the need for change through the identification of problems and dissatisfaction with the current state. Shared information is another way to alert school teachers that the current state is not satisfactory and that there is a need for change. By enabling teachers to make sense of what they hear, see, observe and experience on their own when exposed to a change initiative, school principals indeed will instil positive change beliefs which helps in reducing the likelihood of resistance to change.

Table 13. Teacher Change Beliefs Scale, standardised factor loading, square multiple correlations; average variance extracted, Composite Reliability Index.

	DIS		EFF		PS	
	SFL	SMC	SFL	SMC	SFL	SMC
DIS1	.87	.75				
DIS2	.92	.85				
DIS3	.89	.79				
EFF2			.80	.65		
EFF4			.82	.67		
EFF6			.74	.55		
PS2					.76	.58
PS5					.84	.70
PS6					.91	.82
AVE	80.0%		62.3%		70.0%	
CRI	0.82		0.68		0.74	

DIS, discrepancy; EFF, efficacy; PS, principal support; SFL, standardized factor loadings; SMC, squared multiple correlations; AVE, average extracted variance; CRI, Composite Reliability Index.

Table 14. Summarised assessments of convergent validity for TCBS.

Construct	Item	Critical ratio	SFL	SMC	AVE	CRI	Final decision
DIS	DIS1	√	√	√	√	√	Retained
	DIS2	√	√	√			
	DIS3	√	√	√			
EFF	EFF2	√	√	√	√	x ^a	Retained
	EFF4	√	√	√			
	EFF6	√	√	√			
PS	PS2	√	√	√	√	√	Retained
	PS5	√	√	√			
	PS6	√	√	√			

SMC, square multiple correlations; AVE, average variance extracted; CRI, composite reliability index; DIS, discrepancy; EFF, efficacy; PS, principal support.

^aThe construct reliability = .68, accord with or approach the suggestion standard of .70.

Table 15. TCBS average extracted variance and shared variance estimates.

	DIS	EFF	PS
DIS	.80	.61	.40
EFF	.78	.62	.62
PS	.63	.79	.70

DIS, discrepancy; EFF, efficacy; PS, principal support.

Note: Correlations are below the diagonal, squared correlations are above the diagonal, and AVE estimates are presented on the diagonal.

Table 16. The identified TCBS and the concerned items.

Construct	Item Code	Item
Discrepancy (DIS)	DIS1	Change is needed in this school so as to achieve excellent performance
	DIS2	This school needs to improve the way of operation in management
	DIS3	Change is needed to improve effectiveness in teaching and learning of this school
Efficacy (EFF)	EFF2	When I set my mind to it, I can learn everything that will be required when this change is adopted
	EFF4	Change makes my jobs easier in this school
	EFF6	I have the skills that are needed to make this change works
Principal Support (PS)	PS2	Principal has encouraged me to embrace change in this school
	PS5	Principal is committed to the change in this school
	PS6	Principal has stressed the importance of the change in this school

Efficacy was found as another important factor of TCB in the current study. This finding is paralleling the work of Jerald (2007), Eslami and Fatahi (2008) that teachers with a high sense of efficacy are more open and willing to experiment with new methods in any school change. The finding also reinforced the point made by Cheung (2008) that those teachers with high efficacy make greater efforts to resolve problems when facing challenging situations in the process of change. They would not use external factors, such as students' families or the students themselves as excuses for not persisting in efforts to help students learn.

The finding also expands our understanding why teachers with a high level of teacher efficacy have been found to be a distinctive and significant predictor of classroom practice in the face of change (Guo et al. 2010). Efficacy provides teachers with the confidence to take the risk of learning difficult things. They might produce a 'generative capability' that enables them to use teaching techniques which are more challenging in school change. In short, all the above-mentioned research findings support the current finding that *efficacy* is an important factor in TCB as teachers believe that if they have the necessary skills and ability to cope and make the change succeed, they are more likely to buy-in to the change and attempt to make it work.

Principal support was also found as another significant factor of TCB in the current study. This finding is consistent with the observation of Sarros, Cooper, and Santora (2011) that top management support is significant in the change process. It is also in line with the observation of Bernerth et al. (2007) that teachers are more likely to have positive evaluations of the change when they feel that the school principal addressed his or her concerns and is committed to a change. In other words, success of any school change initiative depends on the principals' commitment and ability to build support for the change he or she envisions. If the teachers believe principal support for the change is inadequate, it will influence whether the change initiative will be embraced and vice versa.

The finding is also congruent with the emphasis made by Somekh (2008) that those principals who support the change initiative by creating a culture that allows teachers to try out new practices and making pedagogical support readily available will create positive perception of a change initiative. Consequently, change resistance will be relatively low when a supportive culture was present. Indeed, Hughes and Benigni (2012) made the claim

that support from the leadership creates motivation in teachers and they become more committed to their jobs. In short, it can be concluded that *principal support* is an important factor of TCB as it can motivate teachers and creates positive perception about the change initiative among the teachers and ultimately mitigating change resistance.

Next, *appropriateness*, the proposed solution being the correct one which effectively addressed the discrepancy, was found to be non-significant as an important factor for TCB. To a large extent, the crux of the matter lies in the fact that Malaysia is implementing a centralised education system, whereby the prevalence of the top-down approach and the bureaucratic organisational structure have not given teachers greater autonomy and decision-making power in schools and in the teaching profession. This phenomenon was observed by Tai (2001) while conducting a survey about teachers' participation in school decision-making in Perak, Malaysia, more than 10 years ago. The findings of the research revealed that teachers experienced decision deprivation in the instructional as well as the managerial domains.

However, these phenomena still persist after a span of a decade. The process of hierarchical, top-down initiation resulted in teachers in schools seen only as implementers of the reform, with most of them experiencing decision deprivation in school reform initiative; this was noted by one of the Malaysian respondents, an elite informant, who was involved in a purposive survey conducted by Philip Hallinger in the year 2011 on '*Making Education Reform Happen: Is there an "Asian Way"*':

The typical educational reform movements in Malaysia have almost exclusively been initiated by the Minister of Education and [then passed on] down through the ranks. Teachers in school are seen as implementers of the reform without any contributions upward to shape or decide on reform initiatives. (Hallinger 2011, 14)

Obviously, although school teachers are the front-line implementers in the change process and are the one who should be able to identify and solve structural and instructional problems effectively, they have not much autonomy in determining the strategies as well as reform initiatives to best lead change in schools. All too often, school decision-making has been the province of top management, and teachers are often placed at the end of the education assembly line. Hence, it is not surprising that *appropriateness* was found to be non-significant as an important factor for TCB.

Besides, *valence*, which refers to the beliefs that the change is beneficial extrinsically and intrinsically to the teachers, was also found to be non-significant for TCB. One possible reason why these change beliefs did not underlie teacher motives to support change efforts in schools is that basically as civil servants, teachers have to implement change initiated through top-down approach, regardless if the change is valuable to them, or whether they enjoy the rewards or benefits realised from adopting change. Clearly, even if the outcomes of the change are undesirable or the change is not worthwhile for them, they have to accept the change.

Second, unlike most organisations in the private sector, the tenure system that exists in schools in Malaysia somewhat provides comparatively less opportunities for promotion and access to exciting career development for teachers. This is one form of extrinsic valence. For example, the current average time which enables graduate teachers to progress from DG41 level (the starting pay scale for a fresh graduate teacher) to DG54 level (the highest possible pay scale for a teacher in a non-leadership role) is 25 years (Ministry of Education Malaysia 2013). A 25-year promotion timeframe is relatively long. This removes

incentives for teachers to put in more than the minimum effort in their career, including implementing change for betterment of the students or schools. Moreover, the reality is, 58% of teachers are still at the lowest grade level of DG41 as compared with 1.2% at DG54 (Ministry of Education Malaysia 2013). This reality contributes to the understanding that why *valence* is not relevant to teachers in the change process.

Third, teachers do not enjoy intrinsic valence too, for example, the autonomy for decision-making, which is one form of self-actualisation. As mentioned earlier, most of the teachers in fact experience decision deprivation in the teaching profession, including school reform initiative. Hence, it does not matter whether the change is beneficial to them or not because in the first place not much autonomy is given for them to participate in decision-making to ascertain any form of change initiative. In short, the legacies of bureaucratic and hierarchical regulations in schools, the fewer career development opportunities, combined with a looseness of common parlance of participation in decision-making, as well as the role of a civil servant, have all contributed to the reasons why *valence* was found to be non-significant.

Theoretical and practical implications

Dissimilar with the works of Armenakis et al. (2007), instead of five important precursors that determine the degree of buy-in by private organisational recipients, only three were found in this study namely, *discrepancy*, *efficacy* and *principal support*, which determine the degree of buy-in of the teachers in school change. The researchers believe that although the finding did not fully support the organisational change recipient beliefs theory developed by Armenakis et al. (2007), and as change is often viewed differently in different cultural contexts (Trompenaars and Wolliams 2003), it offers a different but meaningful perspective to the body of previous literature especially in an educational setting.

Second, the TCBM is an empirically tested model derived from a local Malaysian cultural setting. In addition to following an accepted step-by-step procedure for testing the model that resulted in high reliability and validity, the respondents were large ($N = 936$) and SEM, a comprehensive tool for analysis in academic research, was conducted to test the model. It is undoubtedly a scientifically valid model to help better understand TCB. It provides a direction for Institute Aminuddin Baki, the educational leadership training institute designate in Malaysia, and as useful feedback in planning and designing future training and development programmes of change management for school principals. Attention should be placed on helping principals on how to instil, nurture, shape and sustain critical TCB, i.e. *discrepancy*, *efficacy* and *principal support* among teachers as at the central pivot of any change is to win the minds and the hearts of the teachers to work through the change process.

Third, the TCBS offers a promising new measure for examining TCB in the Malaysian context as it can provide more evidence-based assessment. With only nine items, its brevity makes it a welcome tool for both practitioners and scholars. In terms of practicality, it is economic, easy to administer and not time-consuming. Also due to its brevity, it could be used in conjunction with other scales by practitioners or researchers so as to assess other change-related variables simultaneously, such as the attitude and efficacy of change recipients.

Fourth, the findings also provide practical insights for school principals to understand how teachers perceive, react and adapt to change so as to lead change successfully in schools. They may be more attentive to how they interact with teachers and try to consciously temper their predisposition against change and take initiatives to gain their

hearts to the change. Creating conditions to promote and enhance positive TCB through robust and strategic professional development programmes or day-to-day management practices will help to increase the likelihood of teachers to buy-in to the change. Hence, the study provides a timely finding which may alter the traditional conceptions of managing change and offers school principals a lens through which they could better understand, prepare for, or enhance teacher capacity for change.

Limitations and directions for future research

First, to obtain better understanding of TCB, it would be good to collect the data based on various stages of the change process, before, during and after the change. However, due to financial and resource constraints, this was not the case. Any future study to obtain such data would greatly advance our understanding of the phenomena under study and to address the limitation. Second, HPSS and the concerned teachers were the sites and study population chosen for the study. The standard used in choosing sites and respondents was based on the reason that they are 'information rich'. By focusing only on HPSS, the researcher can easily and more accurately identify which were the most critical components of TCB. Similar research could be pursued on a more diverse sample; for example, teachers in the mediocre or low-performing secondary school as well as teachers in primary schools so as to test the validity of the study's model across different samples and the extent to which these can be generalised.

Conclusion

The development of the TCBM was based on the need to identify critical components of TCB in school change. By validating a model and an instrument to identify and analyse TCB, the current study has contributed to a better scholarly understanding of TCB. Additionally, the TCBM is an empirically tested model derived in a local Malaysian cultural and educational setting. It provides direction for practitioners in planning and designing training programmes for school principals in the enhancement of TCB among teachers in schools. Apart from this, with only nine items, TCBS is a promising and welcome tool for both practitioners and researchers. In some small way, the development of a reliable and valid measure of TCB will spur further research that examines the three dimensions of TCB. Importantly, the study may alter the traditional approach in managing change, enabling school change to unfold with less pain but with better results.

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