อิทธิพลขององค์ประกอบในโมเดลเคนที่มีต่อผลการปฏิบัติงานวิจัยปฏิบัติการในชั้นเรียนของครูในโครงการวิจัยและพัฒนาเพื่อปฏิรูปการเรียนรู้ทั้งโรงเรียน

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บทคัดย่อ

งานวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาระดับองค์ประกอบจิตลักษณะด้านแรงจูงใจ และผลการวิจัยปฏิบัติการในชั้นเรียน และ เปรียบเทียบตามตัวแปรภูมิหลัง ของครูในโครงการวิจัยและพัฒนาเพื่อปฏิรูปการเรียนรู้ทั้งโรงเรียน (โครงการ วพร.) ตรวจสอบความตรงของโมเดลผลการปฏิบัติงานวิจัยปฏิบัติการในชั้นเรียน (CARP Model: Classroom Action Research Performance Model) ที่พัฒนามาจากโมเดลเคน (CANE Model) ศึกษาอิทธิพลระหว่างองค์ประกอบจิตลักษณะด้านแรงจูงใจใน CARP Model กลุ่มตัวอย่างเป็นครู 678 คน สุ่มตัวอย่างแบบแบ่งชั้น จากโรงเรียนในโครงการ วพร. จำนวน 37 แห่ง

ผลการวิจัยพบว่าในภาพรวม ครูมีองค์ประกอบจิตลักษณะด้านแรงจูงใจในระดับสูง แต่มีผลการปฏิบัติงานวิจัยปฏิบัติการในชั้นเรียนอยู่ในระดับปานกลาง ครูที่มีการศึกษาระดับปริญญาโทและปริญญาเอก ทำงานในภาคกลาง และอยู่ในสังกัดทบวงมหาวิทยาลัย มีจิตลักษณะด้านแรงจูงใจ และมีผลการวิจัยปฏิบัติการในชั้นเรียนสูงกว่าครูในกลุ่มอื่น ๆ โมเดล CARP มีความสอดคล้องกลมกลืนกับข้อมูลเชิงประจักษ์ ความผูกพันต่อเป้าหมายงาน ซึ่งได้รับมีอิทธิพลมากที่สุดจากความเชื่อในองค์รวมส่วนบุคคลนั้น ส่งอิทธิพลต่อไปยังความเพียรทางปัญญา

Effects of Factors in the CANE Model on Teachers' Classroom Action Research Performance in Research and Development in the Whole School Learning Reform Project

Direk Suksunai

ABSTRACT

The purposes of this study were: 1) to investigate the level of various motivational psychology characteristics (MPC) factors and classroom action research performance (CAR performances) of teachers in RDL project schools, 2) to compare them across various background variables, 3) to validate the developed Classroom Action Research Performance Model (CARP Model), based on Clark's CANE Model, and 4) to investigate effects among MPC factors in CARP Model. The subjects were 678 teachers in 37 RDL project schools selected by stratified random sampling.

The results revealed that, 1) as a whole, teachers' MPC are high but CAR performances are moderate, 2) teachers who have master and doctoral degree, work in the central region, under Ministry of University Affairs, have higher MPC and CAR performances than others, 3) The CARP Model fit nicely to empirical data, 4) personal agency belief has the most effect to goal commitment in turn affects on mental effort.

Introduction

The National Education Act 1999 Section 4, item number 25, which stated that teachers should be promoted and enhanced to conduct classroom action research in order to facilitate and provide learner-centered learning. Apparently, in Thailand, teachers complained strongly that conducting CAR increased their burdens, and they also lacked motivation and knowledge to conduct CAR. In the Research and Development of the Whole School Learning Reform Project (RDL Project), sponsored by the Thai Research Fund (TRF) Commission, headed by Khemmani (2004), CAR was employed as a strategy for the whole school reform at the classroom level. In this situation, all the teachers were motivated to conduct CAR.

Classroom Action research (CAR) is one of the activities that should be launched in a classroom setting, because it helps teachers to figure out a particular teaching, select useful teaching practices, talk about teaching with colleagues, engage in intellectual pursuits and become continuous learners, help students to learn and improve their teaching behaviors, create new forms of professional development and new forms of research and construct knowledge (Madison Metropolitan School District, 2001). Many sources, viz. Kemmis (1988), Madison Metropolitan School District (2001), Mettetal (2001; 2004), Miller (2001), Ithaca city school district (2003), Wiratchai (2003), and Wongwanich (2003) indicated that classroom action research was an important tool for teachers to improve their students in both learning achievement and desirable characteristics. Motivating teachers to conduct CAR is, therefore, the most important function of the administrators.

Among motivational theories, The CANE model, developed by Clark (1999), is a very interesting perspective, as it is so different from other motivational theories by the integration of Ford's Motivational System Theory (MST: Ford, 1992) and three other research perspectives, viz. Solomon (1984), Pintrich & Schunk (1996) and Bandura (1997). It is a two stage model displaying the linkage between goal commitment and mental effort, which in turn acted as cause factors of behaviors. The author, therefore, relies on the CANE model as a motivational factor in explaining variation in human behaviors. In this study, the author was interested in explaining the variation

in classroom action research performance. The reason underlying this study was so the purposes of this research:

1. Investigate the level of motivational psychological characteristics (MPC): goal commitment, mental effort, task value, emotion, and personal agency belief, and classroom action research performance (CARP): classroom action research achievement and classroom action research product, of teachers in the RDL project.

2. Compare MPC and CARP as stated in 1, among teachers in the RDL project, across background variables: school type, educational degree, geographical region, and jurisdiction.

3. Examine the validity of the developed Classroom Action Research Performance Model (the CARP Model) derived from the CANE Model, and then, investigated effects among factors in the CARP model.

Review of the Literature

The Commitment And Necessary Mental Effort Model (The CANE model)

Clark (1999) proposed Commitment And Necessary Effort model (the CANE Model), which consisted of two major factors: goal commitment, and mental effort, which seem to be the main motivational issues in most work settings. In the First stage, goal commitment occurred. The second stage, goal commitment, pursuit of a goal which led to decisions about the quality and quantity of mental effort invested. Goal commitment predicted by multiplicative relationship among three factors: task value, emotion, and personal agency belief. Whereas, mental effort, amount of necessary effort required achieving work goal, was influenced by self-efficacy and goal commitment. The relationship of these factors can be displayed in equation form and figure as follows:

goal commitment = task value x emotion x personal agency

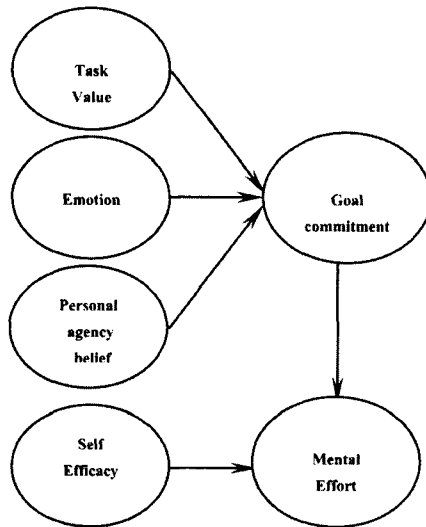mental effort = goal commitment + self-efficacy

Figure 1 Clark's CANE Model (Clark, 1999).

In the CANE Model, mental effort was the final dependent variable. Pintrich and Schunk (1996) suggested that the CANE Model could be extended to explain variations in achievement and performance of individuals.

There were some research studied relating to the CANE model. Hedrick (2001) investigated the correlation between motivational variables of the CANE model and achievement of 490 newly enrolled students in Algebra classes either in a middle school or a high school. The results showed no significant correlation between motivation and performance on the new mathematics problem. Shore (2002) investigated motivation and persistence to exercise, using the CANE model of motivation as a platform. The samples were 309 individuals ranging in age from 18 to 101. This study found that self-efficacy, emotion, and task value were contributors to persistence in exercise. Reynolds (2003) investigated the cause of mathematics anxiety through examining the role that the condition plays in mathematical motivation, specifically, in the CANE model of Motivation. The analysis revealed that mathematics anxiety was a stronger predictor of mathematical persistence than either mathematical self-efficacy or mathematics task value. Further, neither low mathematical self-efficacy nor low mathematics task value appears to cause mathematics anxiety.

In this study, the author attempted to find out whether the CANE model was able to influence the CAR performance focused on CAR achievement measuring the RDL project teachers' CAR knowledge and ability, and CAR product measuring teachers' quality of CAR, and value of CAR. The CANE Model consisted of two major motivational psychological characteristic factors: goal commitment and mental effort, and four minor factors: task value, emotion, personal agency belief, and self-efficacy, were used as the predictors of CAR performance. Eventually, the Classroom Action Research Performance Model (the CARP Model) was developed from the CANE model by adding two dimension of CAR performance: CAR achievement, and CAR product, as the dependent variables affected by the CANE model. Therefore, the CARP model consists of five factors and 14 indicators from the CANE model, and two factors three indicators of CAR performance as shown in figure 3, definition and relationship among those factors in the CARP model were as follows:

Goal commitment (GC) referred to persistence or time spent on tasks, pursuit of work goal over time in face of distraction, and could be measured by two indicators: *persistence (PES)*, and *struggle (STR)*. Goal commitment was influenced by task value, emotion, and personal agency belief. (Clark, 1999; Condly, 1999).

Task value (TV) referred to a belief of individuals, concerning "important to", "interested in", and "utility of" tasks, could be measured from three indicators: *Important to (T_IMP)*, was defined as the significance to a person of doing well on a task, *Interest in (T_INT)*, was defined as the enjoyment or intrinsic curiosity people experience when performing tasks, and *Utilities for (T_UTI)*, was defined as the usefulness of the task for individuals in term of their future goal. (Eccles and Wigfield, 1995; Pintrich and Schunk, 1996; Clark, 1999; Condly, 1999)

Emotion (EMO) referred to subjective feelings which dictated behaviors. Emotion could be measured by two indicators: *positive emotions (EMO_P)* and *negative emotions (EMO_N)*. Positive emotions fostered goal commitment, but negative emotions inhibited goal commitment (Ford, 1992; Boeakert, 1993; Spering, Wagerner, & Funke, 2003)

Personal agency beliefs (PAB), could be measured by two minor factors: (1) *self-efficacy (SE)*, was defined as a belief that one had the necessary skills to attain a goal, measured by confidence to achieve a work goal, measured by two indicators: general self-efficacy and specific self-efficacy, and (2) *context belief (CTB)*, was defined as the circumstances surrounding a work goal, measured by three indicators: *belief in persons (PER)*, *belief in facilities (FAC)*, and belief in *situations (SIT)*. (Ford, 1992; Clark, 1999)

Mental effort (ME) was defined as a conscious, non-automatic cognitive strategy to facilitate goal achievement, when goals were chosen and actively pursued, decisions about the types of knowledge were required to achieve the goal. Mental effort was influenced by goal commitment (Clark, 1999) and self-efficacy (Solomon, 1984; Bandura, 1997). Mental effort could be measured by two indicators: *deliberately*, and *concentration on a* work goal.

Both goal commitment and mental effort affected the teachers' CAR performance, which were studied in two aspects: CAR achievement (CAR_ACH) and CAR product (CAR_PRO). CAR achievement was measured by the teachers' *CAR knowledge, ability, and methodology*. CAR Product was measured by the teachers' quality of CAR report and value of CAR.

The influences of four background variables were studied on the factors in the CARP model, both MPC and CARP, they were: *educational degree, school type, Geographical region and Jurisdiction*

Method

Participants

Of the 678 samples were drawn from 5,747 teachers in 37 of 135 schools of RDL project by stratified random sampling. Most of them were female (82.15%), year of service 20 years or less (92.63%), and teaching position (71.76%), and had bachelors degree or lower (78.47%). A half of them were 40 years old and younger (50.15%), the other half was over 41 years old (49.85%), equally from each type of school, each four geographical regions, and each six jurisdictions.

Table 1 Characteristics of the samples by educational degree, geographical region, and jurisdiction, across school type

School type		Educational degree			Geographical region					jurisdiction						
		Bach. and lover	MA and PhD.	Total	central	northern	southern	North-eastern	Total	ONPEC	General Ed.	Min. of Univ.	Private	Vocational	Municipality	Total
Highly successful	Fre.	308	31	339	57	40	137	105	339	45	37	78	114	36	29	339
	%	90.86	9.14	100.00	16.81	11.80	40.41	30.97	100.00	13.27	10.91	23.01	33.63	10.62	8.55	100.00
Less successful	Fre.	223	116	339	128	109	22	80	339	62	69	38	17	65	88	339
	%	65.78	34.22	100.00	37.76	32.15	6.49	23.60	100.00	18.29	20.35	11.21	5.01	19.17	25.96	100.00
Total	Fre.	531	147	678	185	149	159	185	678	107	106	116	131	101	117	678
	%	78.32	21.68	100.00	27.29	21.98	23.45	27.29	100.00	15.78	15.63	17.11	19.32	14.90	17.26	100.00

Jurisdiction: ONPEC = the Office of Primary Education Commission; General = Department of General Education; Min. of Univ. = Ministry of University Affairs; Vocational = Department of Vocational; Private = Office of the Private Education Commission; Fre. = Frequency

In highly successful schools, almost teachers had bachelor degree and lower (90.86%), worked in southern and north-eastern part (40.41% and 30.97%), under Ministry of University Affairs and Office of the Private Education Commission (23.01% and 33.63%). Meanwhile, less successful schools consisted of more teachers who had master and doctoral degree (34.22%), worked in central and northern region (37.76% and 32.15%), under Department of General education and Municipality (20.35% and 25.96%) (see Table 1). Most of master and doctoral degree teachers worked in central region (39.46%) and under Ministry of University Affairs (38.78%), meanwhile most of bachelor and lower degree worked in the southern part and north-eastern part (28.06% and 25.99%), and under office of the Private Education Commission and municipality (23.92% and 20.34%) (see Tab. 2).

Table 2 Characteristics of the samples by, geographical region, and jurisdiction, across educational degree

Educational Degree		Geographical region					jurisdiction						
		Central	North	Southern	North-eastern	Total	ONPEC	General Ed.	Mis. Of Uiv.	Private	Vocational	Municipality	Total
BA & lower	Fre.	127	117	149	138	531	89	84	59	127	64	108	531
	%	23.92	22.03	28.06	25.99	100.00	16.76	15.82	11.11	23.92	12.05	20.34	100.00
MA & PhD	Fre.	58	32	10	47	147	18	22	57	4	37	9	147
	%	39.46	21.77	6.80	31.97	100.00	12.24	14.97	38.78	2.72	25.17	6.12	100.00
Total	Fre.	185	149	159	185	678	107	106	116	131	101	117	678
	%	27.29	21.98	23.45	27.29	100.00	15.78	15.63	17.11	19.32	14.90	17.26	100.00

Sample size was estimated by over ten times of the number of parameter in developed CARP model, as the suggestions of Hair and et al. (1998) and Wirattchai (1999) that, analyzing the influence among latent variables five samples for each parameter is minimum requirement, but for the robust of statistical analysis, 10 samples should be employed. In this research the author used 678 samples for 23 parameters that much over the minimum requirement.

Data and Instruments

The data for this study were grouped into 5 sets, and were collected by different research instruments as follows:

Set 1, *Motivational Psychological Characteristics (MPC)*: goal commitment, mental effort, task value, emotion, personal agency belief, context belief, and self-efficacy, were collected by five scales Likert type questionnaire, adapting from the existing instruments of Eccles and Wigfield (1995), Solomon (1984), Klien et al (2001), Miller et al (1996), Condly (1999), Corey (2003), Lumpe, Haney, and Czemaik (2000), translated into Thai language, and were developed for this research with Cronbach's Alpha reliabilities 0.069, 0.852, 0.891, 0.865, 0.903, 0.901, and 0.745 respectively.

Set 2, *Background variables*: school type, teachers' educational level, geographical region, and jurisdiction, were collected together with the first set of data by checklist form.

Set 3, CAR *achievement*, measured from knowledge and ability in CAR methodology collected by using a multiple choice test, partial credit scoring, developed by the authors, with Cronbach's Alpha reliabilities 0.702, discrimination power was 0.267, and level difficulty were 0.212 – 0.603.

Set 4, *CAR product: CAR quality* obtained by assessing teachers' CAR reports by employed five level scoring rubrics, developed by the author with inter-rater correlation 0.881. *CAR value*, obtained by evaluating the benefit of CAR contributing to students, teachers who conducted CAR, teachers' colleagues, and new knowledge attained from CAR, checklist form, designed by the author, with inter-rater correlation 0.905.

All of the instruments were assessed for content validity by nine specialists in the field of education, psychology, and measurement and evaluation. The item-objective congruency index (IOC) of each item were range from 0.8 – 0.10. In addition, the instrument for data set 1 was tested for construct validity by the second order confirmatory factor analysis technique, as shown by figure 2 (2.1–2.5).
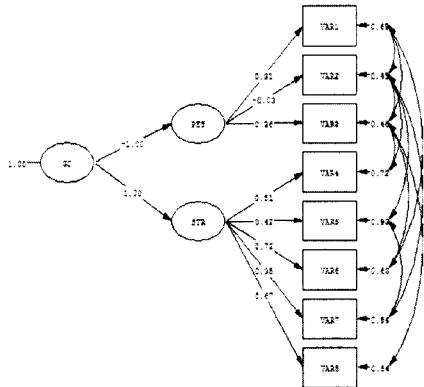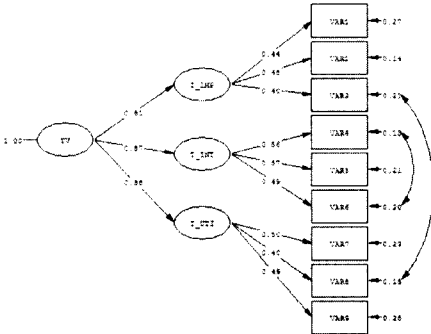
Chi-Square=10.99, df=9, P-value=0.27630, RMSEA=0.018

Figure 2.1 Goal Commitment
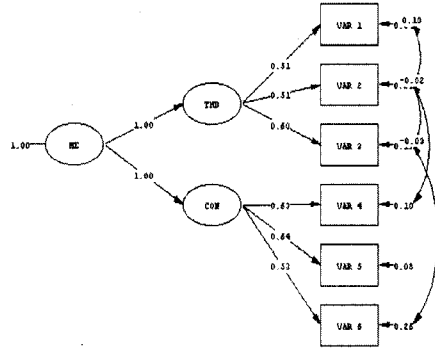
Chi-Square=2.98, df=5, P-value=0.70251, RMSEA=0.000
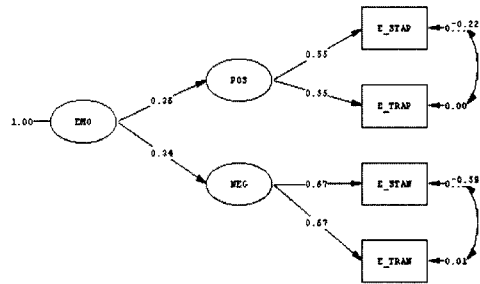
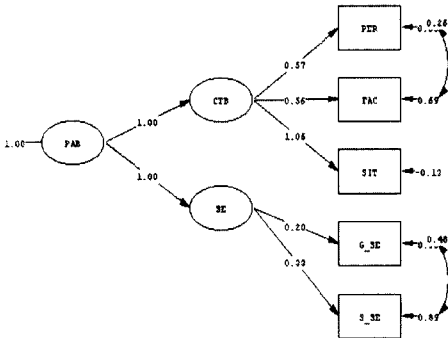**Figure** 2.2 mental effort

Chi-Square=26.67, df=22, P-value=0.22414, RMSEA=0.018

Figure 2.3 task value

Chi-Square=4.57, df=4, P-value=0.33415, RMSEA=0.015

Figure 2.4 emotion

Chi-Square=3.19, df=3, P-value=0.36300, RMSEA=0.010

Figure 2.5 personal agency beliefs

Figure 2 construct validity of 5 MPCs obtained by second order factor analysis

Procedure

Questionnaires for data set one, two, and three were mailed to the teachers in RDL schools across four regions of Thailand at least two weeks before the authors went to collect them back together with their complete CAR reports. The data set four attained by reading 777 CAR reports, and give score by the five level scoring rubrics and checklist form as mentioned in data set 4.

The data were analyzed for: (a) the level of mean of MPC and CARP by descriptive statistics. (b) Mean difference of MPC and CARP across four background variables by MANOVAs, mean, standard deviation, and Post Hoc comparison, (c) The CARP model validation was analyzed by structural equation modeling using the Lisrel program version 8.52

Results

The Level of MPC and CARP

After interpretation means of MPC and CARP into 5 levels by this criteria: 1.00–1.49 = very low, 1.50–2.49 = low, 2.50–3.49 = moderate, 3.500–4.49 = high, and 4.50 and over = very high (Best, 1983), results were as follow (see table 3):

MPC: As a whole, teachers have high MPC: Teachers tried hard to doing well on CAR, highly enjoyment or intrinsic curiosity people experience when performing CAR, and perceive that CAR have high usefulness on their teaching career, indicated by high task value (mean = 4.037), have medium subjective feelings which dictated behaviors to do CAR, indicated by moderate emotion (mean = 3.470). have moderate belief that they have necessary skills to attain CAR and moderately believe that the circumstances surrounding doing CAR can facilitate them, indicated by moderate personal agency belief (mean = 3.262), persistence and spend much time on CAR, pursuit of CAR over time in face of distraction, indicated by high goal commitment (mean = 3.184), and use much conscious, not-automatic cognitive strategy to facilitate CAR, actively pursue CAR, indicated by high mental effort (mean = 3.786).

CARP: the achievement in CAR, and the CAR product they have done are moderate (mean = 2.735, and 3.130). (see table 3)

Table 3 Descriptive statistics of MPC and CARP

factors/indicators	label	Mean	level	S.D.
MPC				
Task value	TV	4.037	high	0.461
Important to	T_IMP	4.275	high	0.513
Interested in	T_INT	3.775	high	0.586
Utilities for	T_UTI	4.061	high	0.534
Emotion	**EMO**	**3.470**	moderate	**0.332**
positive emotion	EMO_P	3.774	high	0.443
negative emotion	EMO_N	3.031	moderate	0.401
Personal agency belief	**PAB**	**3.262**	moderate	**0.427**
Context belief	*CTB*	*3.421*	*moderate*	*0.560*
belief in persons	PER	3.605	moderate	0.663
belief in facilities	FAC	3.271	moderate	0.782
belief in situations	SIT	3.353	moderate	0.571
Self efficacy	*SE*	*3.244*	*moderate*	*0.407*
general self efficacy	G_SE	3.385	moderate	0.419
specific self efficacy	S_SE	3.103	moderate	0.505
Goal commitment	GC	3.184	high	0.439
persistence	PES	3.609	high	0.595
struggle	STR	2.929	high	0.682
Mental effort	**ME**	**3.786**	moderate	**0.600**
deliberately	DELI	3.786	moderate	0.634
concentrate on	CON	3.787	low	0.636
Total (MPC)		3.522	high	0.317
CARP				
CAR achievement	**C_ACH**	**2.735**	moderate	**0.070**
CAR ability	C_ABI	2.735	moderate	0.270
CAR product	**C_PRO**	**3.130**	moderate	**0.486**
CAR quality	C_QUA	2.975	moderate	0.616
CAR value	C_VAL	3.517	high	0.681
Total (CARP)		**2.670**	**moderate**	**0.450**

Mean Difference among Background Variables

Teachers in highly successful schools have higher task value and CAR product than those in less successful schools, but have CAR ability less than teachers in highly successful schools (see Tab. 4.1). Master and doctoral degree teachers have almost all of MPC and CARP higher than bachelor degree and lower, accepted car product is lower (see Tab. 4.2). Teachers in the central region and under the Ministry of University Affairs always have significance higher means of all MPC and CAR products than teachers in other jurisdictions, excepted CAR ability have no difference across geographical region (see Tab. 4.3~4.4).

Table 4 Mean, Standard Deviation, MANOVA and differences among mean MPC and CARP of teachers across 4 background variables (*p < .05, **p < .001)

Table 4.1 type of school

Dependent Variable	Highly successful school (1)		Less successful school (2)		Type III Sum of Squares	df	Mean Square	F	Sig.	difference between means
	mean	S.D.	mean	S.D.						
TV	4.075	0.444	4.000	0.476	0.947	1.	0.947	4.469	0.035*	(1) > (2)
EMO	3.461	0.335	3.479	0.329	0.053	1	0.053	0.482	0.488	(1) = (2)
PAB	3.286	0.430	3.237	0.423	0.398	1	0.398	2.185	0.140	(1) = (2)
GC	3.182	0.423	3.186	0.455	0.002	1	0.002	0.012	0.913	(1) = (2)
ME	3.816	0.561	3.757	0.637	0.590	1	0.590	1.638	0.201	(1) = (2)
C_ABI	2.160	0.265	2.216	0.272	0.531	1	0.531	7.368	0.007*	(1) < (2)
C_PRO	2.199	0.594	2.023	0.715	5.260	1	5.260	12.182	0.001**	(1) > (2)

Table 4.2 educational degree

Dependent Variable	BA & lower (1)		MA & PhD (2)		Type III Sum of Squares	df	Mean Square	F	Sig.	difference between means
	Mean	S.D.	Mean	S.D.						
TV	4.009	0.451	4.141	0.484	2.029	1	2.029	9.653	0.002**	(2) > (1)
EMO	3.446	0.326	3.557	0.338	1.422	1	1.422	13.157	0.000**	(2) > (1)
PAB	3.230	0.419	3.377	0.438	2.515	1	2.515	14.056	0.000**	(2) > (1)
GC	3.143	0.405	3.332	0.518	4.091	1	4.091	21.897	0.000**	(2) > (1)
ME	3.747	0.588	3.926	0.626	3.688	1	3.688	10.369	0.001**	(2) > (1)
C_ABI	2.176	0.267	2.228	0.275	0.311	1	0.311	4.295	0.039*	(2) > (1)
C_PRO	2.090	0.641	2.184	0.734	1.012	1	1.012	2.311	0.129	(2) = (1)

Table 4.3 geographical regions

Dependent Variable	Central (1)		Northern (2)		Southern (3)		North eastern (4)		Type III Sum of Squares	df	Mean Square	F	Sig.	Difference between means
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.						
TV	4.130	0.419	3.960	0.494	3.995	0.440	4.043	0.480	2.787	3	0.929	4.430	0.004**	(1) > (2)
EMO	3.506	0.289	3.456	0.348	3.376	0.326	3.527	0.347	2.260	3	0.753	7.032	0.000**	(1) > (3)
PAB	3.373	0.362	3.202	0.439	3.173	0.440	3.274	0.443	4.114	3	1.371	7.742	0.000**	(1) > (2) (3)
GC	3.279	0.474	3.154	0.422	3.202	0.404	3.097	0.427	3.245	3	1.082	5.734	0.001**	(1) > (2) (4) / (3) > (4)
ME	3.941	0.534	3.707	0.661	3.701	0.620	3.768	0.570	6.606	3	2.202	6.249	0.000**	(1) > (2) (3) (4)
C_ABI	2.206	0.279	2.218	0.255	2.171	0.269	2.159	0.271	0.393	3	0.131	1.810	0.144	(1) = (2) = (3) = (4)
C_PRO	2.112	0.715	2.078	0.667	2.435	0.631	1.857	0.497	28.752	3	9.584	24.065	0.000**	(3) > (1) (2) (4)

Table 4.4 jurisdiction

Dependent Variable	ONPEC (1)		General Ed. (2)		Min. Of Univ. (3)		Private (4)		Vocational (5)		Municipality (6)		Type III Sum of Squares	df	Mean Square	F	Sig.	difference between means
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.						
TV	4.040	0.434	4.154	0.470	4.098	0.437	4.084	0.397	3.946	0.480	3.896	0.509	5.347	5.	1.069	5.178	0.000**	(2) (3) > (6)
EMO	3.414	0.330	3.524	0.342	3.563	0.326	3.473	0.299	3.399	0.341	3.439	0.333	2.264	5	0.453	4.213	0.001**	(3) > (5)
PAB	3.261	0.419	3.302	0.420	3.391	0.444	3.307	0.382	3.114	0.441	3.174	0.413	5.451	5	1.090	6.207	0.000**	(3) (4) > (5) / (3), > (6)
GC	3.246	0.463	3.179	0.450	3.292	0.456	3.171	0.456	3.100	0.433	3.111	0.343	3.127	5	0.625	3.302	0.006**	(3) > (5) (6)
ME	3.768	0.625	3.772	0.656	3.986	0.554	3.852	0.463	3.678	0.656	3.637	0.604	9.036	5	1.807	5.166	0.000**	(3) > (5) (6)
C_ABI	2.155	0.253	2.227	0.250	2.214	0.237	2.166	0.291	2.232	0.321	2.142	0.250	0.853	5	0.171	2.372	0.038*	(2) (5) > (1) (6) / (3) > (6)
C_PRO	2.083	0.585	1.925	0.642	2.260	0.636	2.164	0.582	2.044	0.756	2.154	0.735	7.383	5	1.477	3.424	0.005**	(4) (3) > (2)

Validity of the CARP Model and Effects within It

The CARP Model fit nicely with the empirical data (see Figure 3). It means that the proposed CARP model was developed valid to situation occurring in the context of the RDL project schools. Thus, it could explain how to motivate the teachers in the RDL project to create CAR performance relevant to the real situation of conducting CAR in RDL schools. There were effects statistically significance among mean as follow: emotion, and personal agency belief on goal commitment (0.447 and 0.467 respectively), and goal commitment on mental effort (0.810), no significant effect on CAR achievement and CAR product.
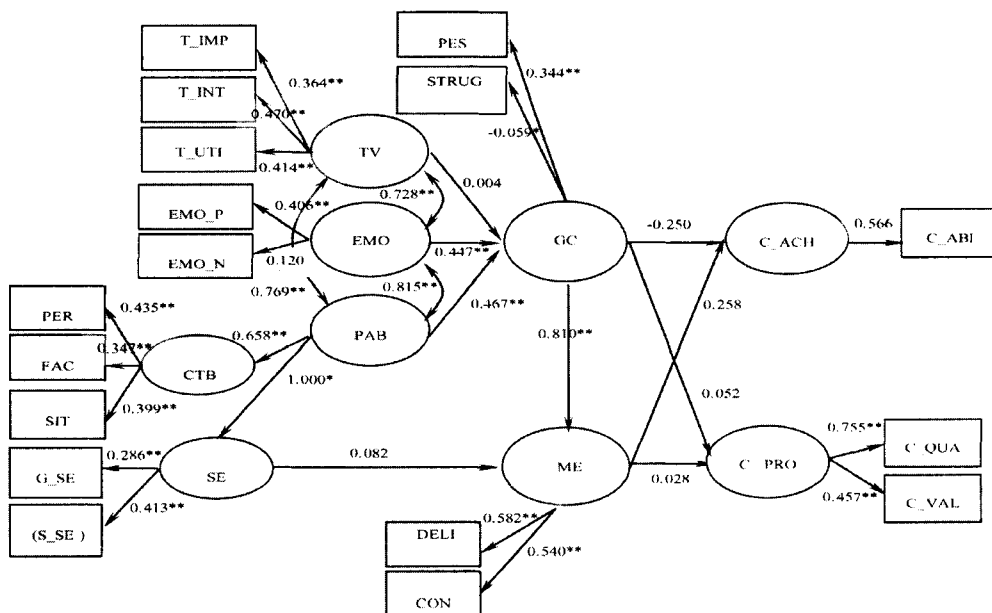
Figure 3 Effects in the CARP Model

χ^2 = 67.232, df = 52, P= 0.076, RMSEA = 0.000, GFI = 0.988, AGFI = 0.966

Discussion

The moderate level of CARP which were found in this research are relevant to the prior finding of Suhlong (2002) that CAR quality of teachers under the jurisdiction of Bangkok metropolitan were moderate. This finding reveals that teachers in RDL project schools still need more knowledge concerning CAR.

Teachers' educational degree: master and doctoral degree teachers have higher MPC and CARP than those who have bachelor degree and lower. This is because, teachers who graduated with a masters or doctoral degree, normally, used to conduct research as a requirement for their graduation. *Type of School:* The means of CAR product of teachers in highly successful schools are higher than those in less successful schools because teachers in highly successful schools consisted and demonstration school teachers who have higher educational degree than those in other jurisdictions (see Table 1). *Geographical region:* The differences among means across geographical regions were caused by the component of teachers in different school types and teachers'

educational degree. For example, the southern part consists of teachers in highly successful schools, the northern part consists of teachers in less successful schools, and the central part consists of more teachers who have a masters or doctoral degree. (see Table 1 and 2) *Jurisdiction:* teachers in demonstration schools always located in university compounds. They have higher education degrees and are considered stronger in academic skills, and are more accustomed to conduct research than teachers in the other jurisdictions. (see Table 2)

The CARP model fits nicely to empirical data and effects among factors in it. These results respond to theories/perspectives which were employed to develop the CARP model: CANE model of Clark (1999), Printich and Schunk (1996), and Solomon (1984). However, there are two path effects of the original CANE model has no statistical significance: task value on goal commitment, and self-efficacy on mental effort. Focusing on the extension part, found that mental effort and goal commitment has no effect on teachers' CAR achievement, CAR quality, and CAR value. This result is relevant to the finding of Hedrick (2001) that there is no significant correlation between motivation and performance on the new mathematics problem, and of Reynolds (2003), that mathematic persistence (goal commitment) got less effect from mathematic task value than mathematics anxiety, but partly relevant to the finding of Shore (2002) that emotion and task value are contributors to persistence in exercise.

Implication

The finding of this study leads to the following three implications: the implication for developing the CARP model, the implication for further research, and the implication for education policy.

There are three strategies for further developing the CARP model. *Firstly,* the CARP model was developed underlying the CANE model (Clark, 1999). Therefore, this research framework was developed based on the CANE model. Even though, it is relevant to the empirical data, it could be further developed by adding direct effects from these the following factors: task value, emotion, and personal agency believe to

these three factors: CAR achievement, CAR product, and mental effort. Then, the CARP model will demonstrate both direct and indirect effects among these factors completely. However, supported literature should be reviewed for these path direct effects. Further more it could add non-recursive effect between CAR achievement and CAR product, because, in general, ones who have more knowledge could do better work one hand. On the other hand, ones who have done better work would earn more knowledge. In addition, three correlation paths could be added among task value, emotion, and personal agency belief, because results of the data analysis show that coefficient correlations among these variables are very high (0.728, 0.769, and 0.815). *Lastly*, adding any kind of RDL project's treatment/activities which were provided to schools/or teachers in RDL project that could affected the goal commitment, mental effort, CAR achievement and CAR product.

Further research should launch as follows. *Firstly*, use control group design to compare the results of the treatment of RDL projects to the MPC and CARP to other schools outside the RDL project. *Secondly*, study the effects of treatment of the RDL project to all variables in CARP model for clearly identifying the effects influencing CARP. *Thirdly*, qualitative methodology should be employed for studying organization culture of teachers/school in the RDL project. This study found that many of the background variables affected the MPC and CARP, such as teacher educational level, geographical region, type of school, jurisdiction. Testing the variation of the CARP model should be done across teachers' educational level, geographical region, and jurisdiction and school type, because this study found that a lot of MPC and CARP were different across these background variables. *Fourthly*, reduce some items in CAR achievement test, because, the author found that many of the teachers did not finish the tests completely. *Finally*, develop a new model of learning or working, using the CANE model as the predictor of another type of performance dependent variable instead of knowledge, quality or value, using in this study. This is because this study found that goal commitment and mental effort is not contribute to these CARP variables. The previous studies of Hedrick (2001), Shore (2002) and Reynolds (2003) found that in different circumstances the effects of variables in the CANE

model affect the dependent variables differently. Therefore, testing for the appropriate phenomena for the perspective of the CANE Model should be further explored.

The implication for education policy can be laid out as follows: *(a)* yet, classroom action research is not a new issue in education. Many teachers in Thailand have been trained, and used to conduct CAR; including teachers in the RDL project, but the finding of this study reveal that CAR achievement, CAR quality, and CAR value of teachers in the RDL project are moderate. So, empowering teachers to conduct CAR should be done, *(b)* use CAR as a criterion for improving teacher's academic position, or salary, *(c)* provide any strategies for increasing teachers' MPC, emphasizing personal agency beliefs to conduct CAR. *(d)* The results of this study demonstrate that the level of teacher education affects on both MPC and CAR achievement, and CAR product. Therefore, encouraging teachers to study further should be done. *(e)* Motivating to conduct CAR is a very hard thing to do, but this study clearly shows that teachers in RDL schools have high MPC; these results show that the RDL project is able to motivate teachers to conduct CAR. Therefore, support to further implement the RDL project, or promote new projects similar to the RDL project should be offered.

One limitation of this study was the method of measuring CAR achievement from knowledge and ability to conduct CAR, by doing a test. As stated before, the CAR achievement test was mailed to teachers across Thailand together with questionnaires for MPC. Therefore, the teachers employed different durations to do test, this may cause to score from doing test, but it was uncontrollable.

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