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Mentoring and Developing Pedagogical Content Knowledge in Beginning Teachers

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Abstract

The impact of globalization has brought changes upon education which requires teachers to be knowledgeable and competent to prepare students for a competitive society. The lack of pedagogical preparation has been identified as a problem among teachers in Malaysia. To address this lack, this study proposed that one-to-one mentoring from experienced teachers in the same school will help in developing the pedagogical content knowledge (Le Shulman, 1987) of beginning teachers so that they become effective practitioners in a shorter time. This study investigates the influence of mentoring empirically on three domains of pedagogical content knowledge (PCK) which are subject matter knowledge (SMK), general pedagogical knowledge (GPK) and knowledge of context (KOC). Questionnaires were administered to a sample of 146 beginning teachers and 90 mentor teachers in urban secondary schools in Malaysia. Results were analyzed through descriptive statistics and linear regression. The findings reveal that there is significant relationship between mentoring and SMK ($\beta = .302, t(119) = 3.471, p < .05$), mentoring and GPK ($\beta = .336, t(120) = 3.944, p < .05$), and mentoring and KOC ($\beta = .372, t(119) = 4.387, p < .05$). Mentoring exerts the most influence on KOC, then GPK and SMK respectively. Overall, there is a significant relationship between mentoring and PCK of beginning teachers ($\beta = .389, t(119) = 4.488, p < .05$). This study provides important information for school principals and educators on the effectiveness of mentoring beginning teachers.

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Keywords: Beginning teacher; Pedagogical content knowledge; Mentoring

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1. Introduction

There are myriad of problems and challenges which face beginning teachers in the early stage of their career and one of them is facing inadequacies in their own knowledge, skills and attributes as a teacher (Romano, 2008). With lack of support from other teachers, these experiences will erode the confidence of beginning teachers over time, leading to higher attrition rate (Ailwood et al., 2006; Ewing, 2006; Spaulding, 2007; Harrington, 2010). Beginning teachers often face reality shock as the theories learned during their training do not fit neatly into real-world practice even for those who have undergone practicum (Veenman, 1984; Schon, 1987). The first year of teaching is described as critical (Spaulding, 2007; Veenman, 1984) and yet, a study in Malaysia showed that beginning teachers are given more responsibilities in and out of classrooms compared to senior teachers in which they need to accept their situation quietly (Noraini & Chang, 1991). Typically, beginning teachers begin their career enthusiastically but experience frustrations as they are assigned the most challenging responsibilities such as problem and least-achieving students and larger classes (Glickman, Gordon & Ross-Gordon, 1987; Ingwolson and Thompson, 2007). The rapid changes in economic, social and technological development in the late twentieth century have also brought about a reinvention in teachers' professionalism (Hargreaves, 1999). Teachers, particularly in secondary school level, are required to be knowledgeable and competent to guide their students to perform well on standardized exams and to prepare them for higher learning (Moir & Gless, 2001; Darling-Hammond, 1997, 2000, 2006; Shulman, 1999; Sykes, 1999; Huling-Austin et al., 1989). Currently, beginning teachers in Malaysia, with or without formal teachers' training, are thrust into the profession with lack of teacher development support such as mentoring. Often, beginning teachers struggle on their own to master the many demands of teaching such as preparation of materials, classroom management and other workloads (Sarason, 1996; Santhanamary & Said, n.d.). A mentoring system by both the teachers' training institutes and schools had been recommended to help beginning teachers adapt to the profession (Noraini, Hasmah & Chang, 1996). Furthermore, an experienced teacher or mentor within their own school would be a suitable person to motivate and guide them as the mentor can understand the circumstances of the school they are teaching (Feiman-Nemser, 1999).

In view of this rationale, this study proposed that one-to-one mentoring from an experienced teacher to a beginning teacher in the same school is a practical way to retain qualified beginning teachers and to help them become effective practitioners in a shorter time through the development of their pedagogical content knowledge (PCK). The concept of mentoring is not widely practiced in Malaysia for beginning teachers' improvement and induction. The lack of pedagogical preparation has been identified as a problem among teachers in Malaysia where principals reported this to be the main barrier to teaching instructions and 82 % of teachers who received feedback from their principals or mentors said it helped them develop plans to improve their teaching (OECD 2009). Mentoring is defined in this study as a process to support teachers to improve their practice, learn professional responsibilities, and positively affect students' learning (Lowenstein, 2003). In Malaysia's education context, the mentor teacher is someone who has the mastery of teaching skills and subject matter knowledge and selected by the principal to provide pedagogical support to an assigned teacher. In cases where there is no formal assignment, it is often assumed that the head of department is the mentor and beginning teachers normally refer to the head when they have needs. Five main areas of mentoring are assessed in this study which are curriculum and instruction, personal and emotional support, providing materials and resources, help with classroom management and giving feedback (Brewster & Railsback, 2001; Whitaker, 2000; Odell, 1989; 1986).

This study seeks to analyze empirically whether these areas of mentoring exert an influence on the development of pedagogical content knowledge (PCK) of beginning teachers. Pedagogical content knowledge (PCK) is defined as

“that special amalgam of content and pedagogy that is uniquely the province of teachers, their own special form of professional understanding. PCK represents the blending of content and pedagogy into an understanding of how particular topics, problems, or issues are organized, represented, and adapted to the diverse interests and abilities of learners, and presented for instruction” (Shulman, 1987, p.8).

The study is focused specifically on secondary school teachers as PCK is an essential area of teacher development in higher level teaching (Shulman, 1987). Three domains of PCK which are subject matter knowledge (SMK), general pedagogical knowledge (GPK) and knowledge of context (KOC) are analyzed separately. SMK is similar to subject content knowledge, GPK refers to the broad principles and strategies of classroom management and KOC means that teachers know how to address the learning needs of students according to their cognitive differences, social, cultural, and language background (Shulman, 1987). The sample are beginning teachers with less than three years of teaching experience, following Berliner (1991) model of teacher's mastery where teachers in the first year are classified in the novice stage and those between one to three years are in the advanced beginner stage.

1.1. Objectives

The purpose of this study is to examine the influence of mentoring in developing the pedagogical content knowledge (PCK) of beginning secondary school teachers in Malaysia in the three domains of subject matter knowledge (SMK), general pedagogical knowledge (GPK) and knowledge of context (KOC)

The study is guided by the following research questions:

- What are beginning teachers' perception of their own subject matter knowledge (SMK), general pedagogical knowledge (GPK) and knowledge of context (KOC)?
- What are beginning teachers' perception of support from their mentors?
- Is there a relationship between mentoring and PCK in the three domains of (a) SMK, (b) GPK, (c) KOC ?
- Is there a relationship between mentoring and PCK as a whole?

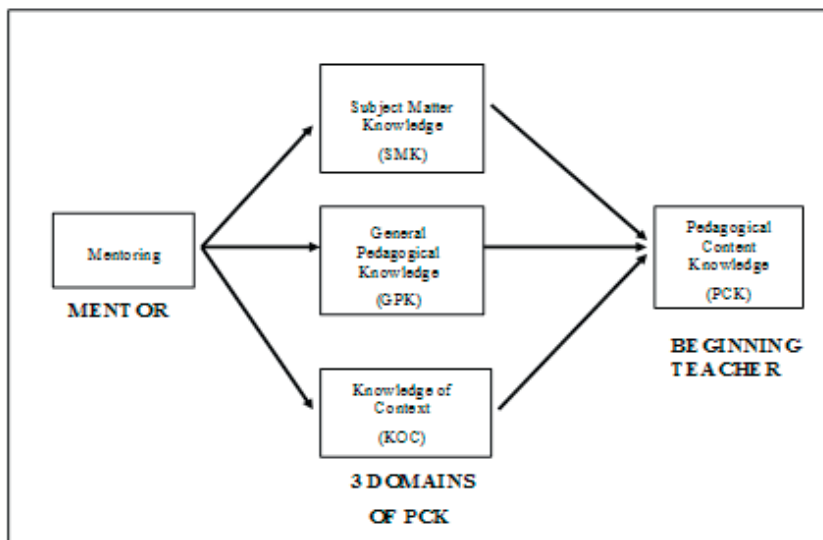


Fig.1. Conceptual Framework

2. Context

2.1. Pedagogical content knowledge

Le Shulman (1987) introduced pedagogical content knowledge (PCK) by merging the two important skills of theoretical knowledge and pedagogical methods required by teachers. According to Shulman, teachers present the subject matter effectively by going through a repertoire of (1) preparing materials by examining and critically interpreting them (2) represent ideas in a way students can understand such as using metaphors (3) select suitable

teaching strategies, methods and models (4) adapt the preparation to the general characteristics of students and (5) taking the materials to diverse and specific learners (Shulman, 1987). Teachers who are developing their PCK will know what students find typically difficult in the subject, find ways to develop a particular idea, use illustrations to communicate a specific idea and know how learners interpret the idea (Shulman, 1986; Ball, 2000). Teaching at higher level require teachers to have a broad knowledge in other subjects apart from the subject taught as well as dealing with large amount of information and solving problems which are more complex (Shulman, 1986). Besides subject matter knowledge, effective classroom management in creating an environment conducive to learning has been shown to have more impact on students' achievement than imparting the right subject matter (Shulman, 1986). Beginning teachers are usually more preoccupied in dealing with subject matter and discipline issues of students than on other areas (Fritz & Miller, 2003). Teachers in Malaysia reported that a percentage of time is lost in handling students' disruptive behaviour or administrative issues in comparison with 23 other countries (OECD 2009). To overcome this, it was suggested that teacher education and induction programs could focus on classroom management prior to and throughout the first year of teaching. Schools in the twenty-first century must adjust to a learner's backgrounds, talents, interests and past performance in order to provide for a wider range of opportunities for students' success (Glaser, 1990). Trained teachers who had undergone teacher education course had significantly higher scores than untrained teachers on pedagogical knowledge (Jones, 1991) which contributed more to students' gains (Monk, 1994; Grossman, 1990).

2.2. *Mentoring beginning teachers*

Beginning teachers must be allowed time to grow as it takes between three to five years to become effective practitioners (Feiman-Nemser & Remillard, 1995). As teachers are expected to remain current in their knowledge and skills in this competitive age through continuous development (Vision 2020, Bak, 2010), on-going efforts are needed to improve teachers' learning and students' achievement (Hellenberg, 2010). When beginning teachers have acquired a higher degree of comfort with basic teaching skills, they will exhibit more favourable behaviours which change with teaching experience. Mentoring program was found to increase the confidence and effectiveness of beginning teachers which result in greater job satisfaction and self-efficacy (Ingersoll & Kralik, 2004; Smith and Ingersoll, 2004). The basic goals of mentoring are to improve teaching performance, reduce attrition of potentially capable teachers, to increase the personal and professional well-being of teachers and to impart the school and teaching profession's culture (Huling-Austin, 2006; Lazarus, 2000). Beginning teachers who enjoyed mentoring relationships viewed the professional climate of their schools more positively than teachers who could not identify a mentor. (Carter & Francis, 2000). Mentoring provides emotional support, encouragement and counseling for beginning teachers so that they feel valued and comfortable about themselves as teachers (Koballa et al., 2007). Beginning teachers feel empowered when their mentors function as collaborative partners as they engage in a co-learning relationship through inquiry, reflection and problem solving, thus reducing the gap between theory and practice. (Koballa et al., 2007). Teachers' collaboration which include mentoring has significant relationship with school improvement (Hoque, Alam & Abdul Ghani, 2010).

3. **Methodology**

3.1. *Data collection*

A quantitative survey method was used to explore the existence of relationships, if any, between mentoring and three domains of PCK. Two sets of questionnaires were administered; one for beginning teachers and the other for experienced teachers. Participants had a choice to answer in English or Bahasa Malaysia. For beginning teachers, the first part of survey consists of 15 items and participants were asked to rate their confidence on SMK (5 items), GPK (6 items) and KOC (4 items) before they started teaching and their current teaching stage using a percentage scale ranging from 0 (cannot do) to 100 (highly certain can do). The second part contained 10 items to measure the extent of support beginning teachers received from their mentor using a 6-point Likert scale. For mentors, the survey contained 10 items to measure the extent of support mentors provide to their mentees using a 6-point Likert scale. Risks to beginning teachers and mentors were minimal and mainly personal such as possibility of negative feelings from their mentor-mentee experience. Beginning teachers may be cautious to report negatively about their teaching experience or about their mentor.

3.2. Population and sample

The population for the study consists of beginning teachers and experienced teachers from private and public secondary schools in Petaling Utama district which is an urban area in Malaysia. Latest statistics from Selangor Education Department (JPS) registered 27 public secondary schools in Petaling Utama in 2010 with a total of 2,280 teachers comprising 1,916 female and 364 male teachers. There were 146 beginning teachers and 90 mentor teachers who participated in the survey from 8 public schools and 2 private schools. This was close to 10 percent of 2,280 teachers which justified the representation of population under study (Gay, 1996).

Table 1. Beginning teachers' demographics

Gender	Male	Female	
	20.5% (n = 30)	79.6% (n = 116)	
Formal teacher education	Yes	No	
	80.8% (n = 118)	19.2% (n = 28)	
Teaching experience	Less than 1 year	1 to 3 years	
	45.9% (n = 67)	54.1% (n = 79)	
Type of school	Public	Private	
	76.0% (n = 111)	24.0% (n = 35)	
Teaching in subject specialized	Yes	No	
	82.9% (n = 121)	16.4% (n = 24)	
Mentor/supervisor when started teaching	Yes	No	
	84.2% (n = 123)	15.8% (n = 23)	
Frequency meet with mentor	Daily	Weekly	As and when need arise
	11.6% (n = 17)	20.5% (n = 30)	53.4% (n = 78)

Note. Some figures do not add up to 100% as some participants did not provide information or it is not applicable to them

Table 2. Mentor teacher demographics

Gender	Male	Female	
	13.3% (n = 12)	86.7% (n = 78)	
Formal teacher education	Yes	No	
	93.3% (n = 84)	6.7% (n = 6)	
Years of experience	Teaching	Mentoring	
	M = 18.74	M = 7.54	
	SD = 8.0	SD = 6.6	
Mentor in subject specialized	Yes	No	
	93.3% (n = 84)	6.7% (n = 6)	
Frequency meet with mentee	Daily	Weekly	As and when need arise
	10.0% (n = 9)	26.7% (n = 24)	63.3% (n = 57)

Note. Some figures do not up to 100% as some participants did not provide information

4. Data Analysis

Data for demographics, measurement of PCK and mentoring support were analyzed using descriptive statistics. The relationship between mentoring and the three domains of PCK were analyzed using simple linear regression. The independent variable is the measurement of mentoring received and the dependent variable is the difference in a

teacher's confidence in PCK before and after they joined the profession. This correlational approach determines how much mentoring effect PCK but it does not explain the causal relationship between them.

5. Findings

5.1. Research question 1: Beginning teachers' perception of their PCK

Table 3. Beginning teachers' perception of their PCK

PCK: List of skills	Before M	N=143 SD	Now M	N=143 SD
I. Subject matter knowledge (SMK)				
Prepare teaching materials	5.46	2.48	7.89	1.60
Having sufficient knowledge in the subject I am teaching	5.55	2.27	8.09	1.60
Use various ways to develop my understanding of subject I am teaching	5.45	2.25	8.04	1.42
Solve problems in subject I am teaching	5.43	2.26	8.19	1.36
Able to answer students' questions in-depth	4.98	2.15	7.98	1.35
II. General Pedagogical knowledge (GPK)				
Specify learning goals I expect my students to attain	4.73	2.08	7.64	1.49
Promote students' participation in class	5.26	2.17	7.69	1.66
Actively engage my students in the learning activities	5.09	2.20	7.73	1.51
Use different evaluation methods	4.75	2.21	7.35	1.63
Adapt my teaching based upon what students currently understand or do not understand	5.13	2.25	7.84	1.46
Organize and maintain classroom management	4.97	2.14	7.80	1.52
III. Knowledge of Context (KOC)				
Adapt my teaching style to different learners	4.85	2.09	7.67	1.51
Use a wide range of teaching approaches in a classroom Setting	4.84	2.12	7.53	1.48
Familiar with common student understandings and misconception in the subject	4.74	2.08	7.78	1.44
Select effective teaching approaches to guide student thinking and learning	4.87	2.19	7.67	1.49

Note: None = 0 to 2.50; Low = 2.51 to 5.00; Adequate = 5.01 to 7.50; High = 7.51 to 10.00

Before they started teaching, beginning teachers indicated their PCK were low for 8 items and adequate for 7 items. The lowest mean was for item 6: *Specify learning goals I expect my students to attain* (GPK) and the highest mean was for item 2: *Have sufficient knowledge in the subject I am teaching* (SMK). After they started teaching, their PCK were high on 14 items and adequate for only one item which is item 9: *Use different evaluation methods* (GPK). The differences in measures of PCK before teaching for all items were higher among the teachers than after

they joined the profession. Majority of beginning teachers, 93.3% perceived their PCK have increased after they joined the teaching profession but a small number of teachers, 6.67% perceived their PCK have declined.

5.2. Research question 2: Beginning teachers' perception of their mentor's support

Majority of beginning teachers, 84.2% had mentors when they started teaching and most of them, 53.4% meet with their mentors as and when the need arise. Beginning teachers indicated that their mentor's support were high on all the items with the highest average mean for providing materials and resources, "My mentor shares his/her resources with me" and the lowest mean for assistance with curriculum and instruction, "My mentor and I have collaborated on lesson plans for our students". Mentors indicated that their support to mentees were high on 7 items and adequate for 3 items. The highest mean was for providing personal and emotional support, "My mentee can come to me to discuss any problem he/she has in the classroom" and the lowest mean was for help with classroom management and instructions, "I give opportunities to my mentee to observe my classroom teaching".

Table 4. Beginning teachers' perception of mentor's support

List of mentor's support	M (N = 125)	SD
1. My mentor teacher consistently anticipated my needs	4.68	.997
2. My mentor has helped me with instructional strategies	4.84	.979
3. My mentor is always willing to listen to me	4.94	.982
4. My mentor always expected me to bring up issues/problems to discuss	4.58	1.041
5. My mentor encouraged me to think about the effectiveness of my teaching	4.72	1.005
6. My mentor has helped me grow as a professional	4.82	1.024
7. I have received meaningful feedback from my mentor	4.87	.975
8. My mentor and I have collaborated on lesson plans for our students	4.55	1.125
9. My mentor shares his/her resources with me	5.02	.937
10. My mentor taught me about curriculum and class management	4.70	1.032

Note. None = 0 to 1.50; Low = 1.51 to 3.00; Adequate = 3.01 to 4.50; High = 4.51 to 6.00

5.3. Research question 3: Relationship between mentoring and SMK, GPK and KOC

Mentoring significantly predicted the development of SMK in beginning teachers, $\beta = .302$, $t(119) = 3.471$, $p < .05$. Mentoring also explained a significant proportion of variance in SMK, $R^2 = .084$, $F(1, 120) = 12.050$, $p < .05$.

Mentoring significantly predicted the development of GPK in beginning teachers, $\beta = .336$, $t(120) = 3.944$, $p < .05$. Mentoring also explained a significant proportion of variance in GPK, $R^2 = .106$, $F(1, 121) = 15.555$, $p < .05$.

Mentoring significantly predicted the development of KOC in beginning teachers, $\beta = .372$, $t(119) = 4.387$, $p < .05$. Mentoring also explained a significant proportion of variance in GPK, $R^2 = .131$, $F(1, 120) = 19.246$, $p < .05$.

5.4. Research question 4: Relationship between mentoring and PCK

Overall, mentoring significantly predicted the development of PCK in beginning

teachers, $\beta = .389$, $t(119) = 4.488$, $p < .05$. Mentoring also explained a significant proportion of variance in PCK, $R^2 = .144$, $F(1, 120) = 20.143$, $p < .05$.

6. Discussion and implications

Majority of beginning teachers have grown in their PCK after they started teaching whether through self-help, on-the-job training or external helps. The small percentage of teachers who perceived their PCK have declined may reflect more accurately the lack of confidence of teachers as they became more realistic about what they can or cannot control through their teaching instructions (Guskey, 1988). Of the three domains, beginning teachers were least competent in KOC and most competent in SMK. A possible interpretation could be teachers are faced with diverse students of different cognitive levels and attitudes in large class sizes and hence, it is difficult to set learning goals which will meet the needs of all students. SMK is a skill which could be more easily mastered with time and persistence compared to GPK which changes with the variation in students. Teachers in Malaysia admitted to using structured practices which do not adapt to individual student's needs (OECD, 2009). Teachers with formal teacher education reported higher PCK in contrast to 2.8% of untrained teachers who rated zero confidence in their PCK when they started teaching. This further enforces the values of mentoring to help untrained teachers to gain competence in teaching. However, trained and untrained teachers matched up in their PCK after they started teaching with some reported their confidence as high as 90%. There are evidences that some first-year teachers were more effective than seasoned teachers and attributed their success to their teacher education program (Darling-Hammond, 2006). Beginning teachers were satisfied with the mentoring support they received and informal mentoring relationships do take place even though formal mentoring is not implemented in secondary schools. Beginning teachers, 15.8% who reported they had no mentor implied that some of them do not feel supported by any teachers in the school.

There is a significant positive relationship between mentoring and the three domains of PCK. Mentoring has the greatest effect on KOC, followed by GPK and lastly, on SMK. As the variability was not high, there are other factors besides one-to-one mentoring which have possibly aided the development of beginning teachers. A limitation to the study is the difficulty in measuring teachers' PCK as there is a full range of underlying abilities of teachers' content and pedagogical knowledge (Rowan Schilling, Ball and Miller, 2001). The study is also not able to determine whether mentors help their mentees develop teaching skills through routine tasks or going through the cycle of pedagogical reasoning and action as conceptualized in Shulman's PCK. This is because in Malaysia, many teachers have been trained that teaching is merely knowledge telling and learning is knowledge consumption (Malakolunthu, 2007). Lack of training in PCK for both mentors and mentees will result in behavioural patterns of teaching which are effective for lower-level skills such as recall and recognition of knowledge but it is inadequate for higher-level skills such as analysis, integration and invention of knowledge (Darling-Hammond, 2006). The latter skills are much needed for secondary schools in Malaysia today as study by Husin (2006) confirmed that questioning techniques of teachers in Malaysia are in the low-order categories and teachers tend to dominate classroom discussions.

Teachers have greater responsibilities today due to increasing demands such as managing students' diversity and meeting new standards for students' performance (Romano, 2008). Support of the technical aspects of teaching can be therapeutic when the mentor play the role of nurturing the beginning teacher (Young et al., 2005). Structured professional development programs such as mentoring can continue to foster development of PCK in beginning teachers as teacher education cannot possibly teach them everything they will need to know as professionals (Grossman, Schoenfeld & Lee, 2005). The mentoring program which was implemented in 1996 by MoE should be reignited to help beginning teachers at the start of their career (Lazarus & Tay, 2000). Mentoring is a form of professional development activity which takes place at regular interval in a stable, social context and it impacts teaching practices more strongly than workshops and courses (OECD, 2009). Teacher learning is complex and cannot be achieved significantly through short courses (Malakolunthu, 2007). Teachers who see themselves long-term in the profession will put more effort to develop their PCK and less likely to leave teaching in their first year. Teachers' confidence in their capability can be positively impacted by an increase in training which are designed to support a teacher's development of content knowledge with pedagogical emphasis. (Swackhamer, et al., 2009; Ma,

1999; Appleton, 1995). Education for students will not improve until we acknowledge that schools are places not only for teachers to work but also for teachers to learn as they share with other teachers with different knowledge and experiences on an on-going basis (Smylie, 1995). Learning more about beginning teachers' abilities in their PCK will inform policy makers, principals and education managers on how to nurture and retain beginning teachers. The outcome of successful mentoring program will result in production of quality teachers in a shorter time, which will have direct impact on students' gains.

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