

Validation of a Measure of Personal Theories about Teaching and Learning

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Abstract

A validated instrument was developed to measure a group of Hong Kong teacher education students' personal theories about teaching and learning. MANOVA study of the identified personal theories dimensions indicated there was no statistical significant differences across age, gender and elective groups. Implications were also drawn for teaching education development and research.

Introduction

Research in teacher education has suggested that many of teachers' classroom decision-making and actions are based on certain theoretical framework which are beliefs driven (Calderhead, 1996; Clark & Peterson, 1986; Marland, 1995, Richardson, 1996). These theoretical framework represent teachers' conceptions about teaching and learning, and are derived from their inherent beliefs. Review of research literature in teachers' beliefs and thinking has found a myriad of labels or interpretative terms conceptualizing key features of teachers' thinking or beliefs about their professional practice. Included amongst these terms are 'teacher conceptions', 'teacher perspectives', 'constructs', 'understandings', 'teachers thinking', 'attitudes', 'beliefs' and 'values', 'metaphors', 'images', 'pedagogical content knowledge', 'practical knowledge', 'implicit theories', 'personal theories', and 'principles of practice' (Calderhead, 1996; Calderhead & Robson, 1991; Marland, 1995, 1998; Munby, 1986; Munby & Russell, 1989). This diversity of terms has created confusion about their commonalties and differences. For example, Kagan (1990) has used the terms beliefs and knowledge synonymously in her analysis of methodological issues inherent in studying teachers' knowledge. Such approach is based on the rationale that teachers' knowledge is subjective and, therefore, much more like beliefs (Richardson, 1996). Related to this, Pajares (1992) has emphasized the need of cleaning the mess associated with the meaning and definition of beliefs. In this paper, the author intends to use the term "Personal Theories" throughout to reduce any confusion. To the author, teachers' beliefs about teaching and learning shape their conceptions about teaching and learning and are held implicitly. Despite commonalties in principle, such implicit beliefs or conceptions are unique individually and therefore the author prefers to use the term personal theories to represent teachers' implicit theories or conceptions about teaching and learning.

The Nature and Meaning of Personal Theories

Teaching takes place within an ill-defined situation, and teachers constantly have to face and respond to the ever changing and unanticipated classroom events. They have to rely on their professional judgments about what teaching should be and how to respond to classroom events. Such judgements are based on certain frames of reference which guide teachers' decision making and structure classroom activities. These frames of reference constitute a theory, which endows teachers with a capacity to predict what will work and thus

produce desired outcomes in the classroom. It is postulated that teachers base their teaching practices on the theories they hold about teaching and learning. These theories might be expressed indirectly through curriculum structures (what is taught), teaching methods (how it is to be taught) and assessment (what are valued as learning outcomes) (Samuelowicz & Bain, 1992). That is, it is a theory which shapes action in the classroom and is constructed from interpretations of past actions. For this reason, personal theories have been referred to as "theories for action" or "practical theories". Various attempts have been made to define what constitutes teachers' practical theories. For example, Handal and Lauvas (1987) saw a teacher's practical theory as a "personal construct" and defined it as a "...s private, integrated but ever-changing system of knowledge, experience and values which is relevant to teaching practice at any particular time" (p.9). Sanders and McCutcheon (1987) defined practical theories as "... the conceptual structures and visions that provide teachers with reasons for acting as they do, and for choosing the teaching activities and curriculum materials they choose in order to be effective" (p. 52-3).

Some theories are explicit and communicable but many aspects of such a theory, however, are tacitly held and cannot be readily articulated and for this reason, are also known as "implicit theories". In this study, they will be referred to as "personal theories" because they come from one's conceptions of teaching and learning. They are not standardized or universally held. Such personal theories are individualistic and particularistic, varying from teacher to teacher and even from context to context for the same teacher. (Sanders & McCutcheon, 1986). Personal theories are developed around one's conception of teaching and learning, which often brings forth certain images of teaching. How one conceives teaching and learning is influenced by one's knowledge, experience, beliefs and values. How they relate to each other and interact is still unknown and it suggests a plausible and valuable domain of research.

Despite the uniqueness of personal theories, one expects there are common elements at the boundaries of individual personal theories. (e.g. a continuum in adopting various class management skills in teaching, ranging from liberal to authoritarian approach). The common elements come from similar principles and interpretations of the class situation. Given the existence of such common elements this suggests a possible channel to study the teaching theories of groups of people based on the common elements. There have been some quantitative measures of teachers' beliefs and theories about teaching and learning conducted by survey studies. Therefore, besides qualitative method of case studies and interviews, quantitative measures of responses from survey is an alternative which can also produce useful generalized findings in the study of personal theories about teaching.

The Source of Personal Theories

One source of individuals' personal theories about teaching and learning is what they are taught in teacher education programmes. Studies in areas such as educational foundations, methodology/pedagogy, academic disciplines and curriculum theory are expected to provide knowledge relevant to teaching. However, students appear only to use such knowledge to explain and justify comments offered by teachers on their classroom behaviours (Marland, 1995). Often, teachers' classroom practice is found to be inconsistent with what they learnt in college and university. This suggests there may be more influential elements in shaping personal theories about teaching and learning. These are probably deeply rooted in personal experiences, especially in-school ones, and based on interpretations of those experiences. Research has indicated that teacher education students attend colleges and universities with initial ideas and beliefs, developed from their early days of schooling (Brookhart & Freeman, 1992; Calderhead & Robson, 1991; Desforges, 1995; Hollingsworth, 1989; Lortie, 1975; Tillema, 1995). Such elements are the components of the teachers' future personal theories about teaching and learning. Because the roots of teaching behaviours are so deeply

embedded in the life histories of teachers, they are often unaware of them and seldom can they make them explicit. Very often, teachers get used to them and patterns of thoughtful action become routinized. Because of the saliency of personal theories, teacher education students may not accept what is being provided in their teacher education programs if this education conflicts with prior beliefs. A teacher education student who is used to a traditional way of teaching by his high school teachers will possibly carry an educational belief that the teacher's role is a dispenser of knowledge and the students' role is that of passive recipients. He or she may not readily accept a constructivist view of reflective learning advocated in a teacher education course. During teaching practice, he or she probably retains his or her believed way of learning and teaching, especially when the school climate favours this mode of instruction. This is referred to as the filter function of beliefs in knowledge acquisition in teacher education program, reported in related literature.

Researches have shown that educational beliefs or value orientations appear to play an influential role in teacher judgements about what knowledge to retain in memory, permitting individuals to select and store information they consider most relevant and useful (Ennis, Cothran, & Loftus, 1997). To change students' behaviour through curriculum reform, it will be necessary to understand their belief systems and make known to them what they conceive teaching and learning to be before changes in teacher education curriculum are effective. This has been well documented by various researchers. Marland (1993, 1995) has mentioned that the recognition of personal theories of student teachers has significant implications for preservice teacher education. Teachers wishing to identify problems in their teaching, improve performance, or adopt new approaches must first fully understand the personal practical theories which give rise to their current action (Marland, 1998). The view that self-knowledge is need as an essential prerequisite for change or improving performance has been shared by many educators, although expressed in different wordings. For example, Briscoe (1996) recommended that teachers with a mind to change consider not only their actions and consequences, but also "... the beliefs, values and other knowledge which contribute to motivating and creating a rationale for that action: (p.315). Fullan's (1982) advice for making significant changes in teaching also involved teachers understanding themselves and making "...Changes in goals, skills, philosophy or beliefs, behaviour, etc." (p.29). Thus, assisting student teachers to become aware of their attitudes and beliefs, and the images they have of themselves as teachers, will help to reveal the basis for their actions in the classroom and enable them to identify more readily what is inappropriate or problematic in their personal theories. Teacher educators also need to have knowledge of how their student teachers think and what they believe in teaching and learning. Insight into the personal theories of student teachers provides a basis for teacher educators to make adjustment, plan more effective, specific and generic teaching strategies to help them learn to teach and to effect changes in their belief.

The Need to Study Personal Theories

The importance of personal theories in guiding teachers' action and behaviour in the classroom, the uniqueness of personal theories, and the influence of one's prior beliefs on the development of personal theories about teaching and learning implies the need for further understanding of teachers' conceptions of teaching and learning, which has been a focus of research in the 1990's. This also underpins the significance and reason of conducting an exploration of teacher education students' personal theories in the author's study.

Objectives

This study intends to examine teacher education students' personal theories about teaching and learning. Literature review has shown that many studies of teachers' or teacher

education students' conceptions or personal theories about teaching and learning are conducted by means of qualitative means, such as case studies, interviews, narratives and analysis of reflective journals. There are few quantitative studies attempted and instrumental measures of personal studies are limited. This study attempts to develop an instrument to measure personal theories within a group of Hong Kong teacher education students. Based on these, the following research questions are drawn.

1. What are the characteristics of personal theories of teaching/learning held by Hong Kong teacher education students of the Hong Kong Institute of Education?
2. Are there differences in such theories in terms of age, gender and fields of study?

Method

The study involved the development and validation of a questionnaire instrument to measure the personal theories of a group of Hong Kong teacher education students. The questionnaire was developed from iterative processes of factor analysis, item identification and modification. 385 teacher education students of the Hong Kong Institute of Education were asked to complete a questionnaire developed by the author. The questionnaire used in this study consisted of two parts. The first part sought demographic data of the participants while the second part elicited responses to questions designed to tap the personal beliefs (beliefs) of participants using a Likert five-point scale.

Participants

385 students of the Certificate in Education Course (CE) participated in this study. There are two streams in this course, the English and the Chinese stream. The CE Course is a two-year full-time sub-degree course designed to educate non-graduate teachers for primary and junior secondary school teaching. Students admitted to the two-year full-time CE course have to possess at least two Advanced Level ("A" level) subjects pass, the normal entrance requirement to universities in Hong Kong. Therefore, the students of CE course are roughly equivalent to university undergraduates. The English and Chinese streams of the CE streams basically are the same, in terms of admission requirement and curriculum. Differences exist with respect to the lecturers and the medium of instruction. Some native English speakers are employed as lecturers for the English course and these students are expected to teach in English during their teaching practice. The age of the students ranged from 20 to 40. Many of them were around 21 and 22. Of those who indicated their gender, 115 were male and 263 were female students (in the ratio of 30% to 70% respectively). This proportion was approximately the same as that of male to female (about 1: 2.8) in the Institute.

Material

The personal theory questionnaire/instrument used in this study was constructed from basic issues and required several stages of working. The first stage involved reviewing the literature and reflecting on the prevailing approaches to teaching in the institute concerned. The latter process involved dialogues with groups of teacher education students about what they think and are concerned about teaching. The dialogues were conducted during lectures, before and after teaching practice/ practicum. These conversations with students allowed understanding of their thoughts and beliefs about teaching and learning, their educational theories, teaching methodologies and approaches to be taught in the teacher education institute. The conversations enabled the author to be more aware of the confidence and concern of the students about their classroom teaching before teaching

practice (Chan & Leung, 1998) under the impact of local and western cultural influence (Chan & Leung, 1999).

From these dialogues and the analysis of the literature, five categories of important issues about the work of teaching were identified and developed. They are

1. the meaning of teaching and learning;
2. the role of the teacher and students;
3. the role of peers, individual versus group learning;
4. students' abilities and needs;
5. the ways of teaching and class management.

As well, two broad perspectives on teaching viz. a traditional and a constructivist perspective are identifiable in the literature (Woolfolk, 1995; Shuell, 1996) and addressed in teacher education programmes. Teacher education students were influenced by these two perspectives when they talked about the work of teaching.

By a traditional perspective, students meant that class learning is teacher-centered, the teacher teaches or lectures and students listen and receive knowledge. In this respect, students need to be quiet and be controlled in order for learning to take place. By a constructivist perspective, they meant that class learning is student-centered. The teacher does not lecture or talk all the time but uses a variety of aids to motivate students' interest and stimulate their thoughts in the learning process. Noise is allowed in the classroom, students can move around as they learn through interactions, with their peers, resources and teachers.

Teachers or teacher education students might vary their perspectives about teaching in the aforementioned issues or areas of teaching work. Thus, one way of structuring the reported ideas about teaching was to use a two dimensional framework. On one dimension would be the five categories of teaching issues noted above while on the other would be the two perspectives of teaching (Traditional versus Constructive). For example, a traditional perspective in relation to the ways of class teaching and management would be "The teacher has to exercise his/her control over the students". Meanwhile, a constructivist perspective would be "Teacher is to provide activities to stimulate students' thoughts and ideas", or "A student is to learn actively in groups with his or her peers rather than confined to his/her desk and textbook".

Using these ideas, a two dimensional framework was constructed integrating five basic issues and ideas about teaching and the two perspectives, traditional and constructive. This derived two dimensional structuring device was then adopted as a way of reflecting on the literature in the area. Specifically, reference was made to articles dealing with the dimensions of teachers' beliefs and conceptions in quantitative studies (e.g. Bramald, Hardman & Leat, 1995; Schumm, Vaughn, Gordon & Rothlein, 1994; Tatto, 1996), and qualitative studies involving interviews and case studies (Dunkin & Precians, 1992; Hawkey, 1996; Hughes & Wedman, 1992; Johnston, 1994; Wilson, Konopak & Readence, 1994). Also, the author made use of the opportunity of school visits during teaching practice periods to talk to the teacher education students to explore their concerns and conceptions about teaching. These conversations with them also enabled the author to develop a better understanding of what they think and believe about teaching before and after teaching

practice, and helped the author to generate ideas to write items for the questionnaire instrument.

Items for the five issues and two perspectives noted above were drawn from the literature and discussions with the student teachers. With the ideas in hand, the author initially prepared a questionnaire of 50 items which were examined by a team of two lecturers experienced in teaching Educational Psychology to ensure face validity of the contents and clarity in language. The questionnaire was first administered to 220 students and the item responses were factor analyzed. Only items with loading greater or equal to 0.3 were retained. Inter-item reliabilities analysis was applied to remove any undesirable items. Opinions from the students on the clarity of items were also sought. Repeated processes of item identification, factor analysis, item clarification end up with a revised questionnaire comprising of 35 items.

Study of Personal Theories and Relation with Demographic Variables

The 35-item Personal Theories questionnaire was administered to 385 teacher education students of the Certificate in Education (CE) Course of the Hong Kong Institute of Education. A five-point Likert scale from 1 (representing Strongly Disagree) to 5 (representing Strongly Agree) was used. Exploratory factor analysis with Maximum Likelihood and oblimin rotation, setting eigen value greater than 1 as cut-off with scree plot check was applied to the responses. Confirmatory factor analysis employing LISREL8-SIMPLIS command language was used to validate the personal theories questionnaire instrument.

MANOVA was applied to examine if there is any significant difference in personal theories across different age, sex, elective and course groups. Gender was divided into two groups: male and female. Electives studied were divided into five groups: 1 – Business and Technology, 2 – Cultural Subjects, 3 – Language Subjects, 4 – Mathematics and Science, 5 – Social Subjects. Course was divided into two groups: the Chinese and the English stream. To reduce Type 1 error, a significance level of 0.01 was adopted.

Results

Personal Theories Dimensions

Two factors containing 30 items (with loading of 0.3 and above) were extracted, accounting for cumulative percentage variance of 28.92 per cent. The first factor represents the Constructivist Conception (Cronbach alpha = .84) and the second factor represents the Traditional Conception (Cronbach alpha = .84) of teaching and learning. Most of the written items to tap the two conceptions loaded on the two factors, giving a total number of items extracted equal to 30, which was within the targeted number of items. The Cronbach alpha values of the two subscales and the whole scale (.86) were good, implying satisfactory internal consistency of the subscales and questionnaire instrument to measure the intended construct.

Confirmatory factor analysis with LISREL 8-SIMPLIS provided a satisfactory goodness-of-fit index of .93 (GFI = .93, AGFI = .90), RMSEA (.054), RMR (.05) and Chi-square values ($\chi^2 = 190.51$ and $df = 89$, $p^{**} = .00$), supporting a two factor structure of personal theories dimensions. The result also indicates the developed the suitability of the instrument for the Hong Kong sample for further application study and analysis .

MANOVA study of personal theories with age, gender, electives and courses

No significant multivariate age effect was found at the .01 level of MANOVA study of the dimensions of personal theories in terms of the age groups. (Pillais = .01745, $F = 1.06483$, $df = 6, 726$, $p > .01$) There was also no significant difference in terms of elective groups at the .01 level of significance as shown by the values of the significant test criteria. (For electives 1, Pillais = .01147, $F = .52907$, $df = 8.00, 734$, $p > .01$. For electives 2, Pillais = .04241, $F = 1.98769$, $df = 8.00, 734$, $p > .01$).

However, there was a significant difference at the .01 level in the personal theories in terms of the course from which they came. (Pillais = .03647, $F = 7.17245$, $df = 2.00, 379$, $**p < .01$). Because of the significant multivariate result, univariate analysis was undertaken for each of the two personal theories dimensions/subscales. The F values of both dimensions/subscales were significant at the .01 level. That is, there was a significant difference in the beliefs of Traditional and Constructivist Conceptions between the Chinese and the English Course at the .01 level ($**p < .01$). The result of the univariate F-tests to study the two personal theories dimensions in the Chinese and English courses is summarized in Table 1 .

Table 1 Univariate F-tests Study of the Two Personal Theories Dimensions/Subscales across the Chinese and English Course

Variable	Hypo.SS	Error SS	Hypo MS	Error MS	F	Sig. of F
Traditional Conception	6.24	313.88	6.24	.83	7.55	.006**
Constructivist Conception	10.48	309.58	10.48	.81	12.86	.000**

To trace the source of the significant differences of the two personal theories with respect to the courses, further statistical descriptions of the factor scores of the two courses in these two dimensions are provided in Tables 2 and 3 respectively.

Table 2 Statistical Description of the Personal Theories Dimensions: Traditional Conception across the Chinese and English Course of Hong Kong Teacher Education Students

Traditional Conception

Chinese Course (N = 246)		English Course (N = 139)	
Mean 2.58	S.E. Mean .03	Mean 2.72	S.E. Mean .04

Std Dev. .46	Variance .21	Std Dev. .45	Variance .21
Kurtosis .71	S.E. Kurt .31	Kurtosis .50	S.E. Kurt .41
Skewness .38	S.E. Skew .16	Skewness .06	S.E. Skew .21
Range 2.78	Minimum 1.39	Range 2.72	Minimum 1.39
Maximum 4.17		Maximum 4.11	

Table 3 Statistical Description of the Personal Theories Dimensions: Constructivist Conception across the Chinese and English Course of Hong Kong Teacher Education Students

Constructivist Conception

Chinese Course (N = 243)		English Course (N = 139)	
Mean 1.81	S.E. Mean .02	Mean 1.94	S.E. Mean .03
Std Dev. .34	Variance .12	Std Dev. .37	Variance .14
Kurtosis -.16	S.E. Kurt .31	Kurtosis 2.25	S.E. Kurt .41
Skewness -.46	S.E. Skew .16	Skewness .61	S.E. Skew .21
Range 1.83	Minimum 1.00	Range 2.33	Minimum 1.00
Maximum 2.83		Maximum 3.33	

The Mean Subscale Scores of Personal Theories Dimensions: Traditional Conception across the Chinese and English Course were compared by Independent Groups t-test. The t-value, df, and 2-tail Significance test for the equal variance estimates were used to determine whether group differences existed for the Chinese and English Courses in the belief of Traditional Conception. The 2-tail Significance test for the Traditional Conception indicated that $p < .01$ and thus there was a significance difference between the beliefs in Traditional Conception between the Chinese and the English Courses students.

Similar to the Traditional Conception scale, the 2-tail Significance test for Constructivist Conception indicated that $p < .01$. Hence there was a significant difference in the mean of the beliefs in Constructivist Conception between the Chinese and the English Courses students.

Discussion and Conclusion

The validated personal theories questionnaire consisted of 30 items, distributed within the two dimensions/subscales, viz. The Traditional and Constructivist Conceptions.

The Traditional Conception subscale contained 18 items, to identify whether individuals believe that teaching and learning occurs in a traditional, transmissive manner. The following are examples of such items.

"The major role of a teacher is to transmit knowledge to students (B2)";

"Learning occurs primarily from drilling and practice (B4)";

"Teaching is simply telling, presenting or explaining the subject matter (B9)"

"Teachers should have control over what students do all the time (B6)".

The Constructivist Conception subscale consisted of 12 items, tapping whether individuals believe that teaching and learning occurs according to constructivist perspectives. The following are examples of such items.

"Effect teaching encourages more discussion and hands on activities for students (B7)";

"The focus of teaching is to help students construct knowledge from their learning experience instead of knowledge communication. (B23)".etc.

The identified personal theories is considered as a continuum, varying along two extreme polarities. The tendency of a teacher education student to believe in the Traditional or Constructivist Conception is inferred from the relative position of the subscale mean scores of each dimension. Thus from the responses made to the questionnaire, the personal theories profile of individual teacher education students can be worked out and help the students to analyze their conceptions about teaching/learning, which is considered an important step in facilitating them to learn how to teach in the processes of professional development.

The computed means of the subscale scores assigned by the teacher education students in both the Chinese and the English Course were below the mid-point of the five-point scale. This implied that students of both courses tended to disagree with the Traditional Conception about teaching and learning (Teacher as the primary source of knowledge and Knowledge is better learned through repetition, drilling and memory work). In general, the

students of both courses were not certain/undecided as to whether teaching and learning should be conducted in a traditional approach. Nevertheless, the position of the mean subscale scores towards the lower end of the continuum/scale implied that students of both courses, to a limited extent, believed that learning is better constructed through one's own experiences, rather than having the correct answers provided directly by the teacher. This tendency was more obvious for the students in the Chinese Course than in the English Course because the mean subscale score of the Chinese Course was further from the mid-point. This is rather surprising if it is assumed that the students of the Chinese Course were more influenced by the Chinese traditional culture, abided authority and the teacher conceived as an authority figure suggesting an inclination towards the Traditional Conception. It should be noted that this kind of assumption might be somewhat oversimplified and there might be some other factors, which needed to be considered.

Similar conclusions can be drawn from the mean subscale scores of the Constructivist Conception which were below the mid-point in the five-point scale for both courses. The mean of the subscale score in the Chinese Course was less than that of the English Course. This result implies that while students of both courses may be uncertain about the Constructivist Conception of teaching/learning, to a limited extent, they believe that learning is achieved through practice and drilling, after the teacher provides correct knowledge. This tendency was more obvious in the Chinese Course than the English Course. This might explain the significant differences in the MANOVA analysis of the personal theories dimension on Constructivist conception across the two courses.

MANOVA study indicate no significant differences in personal theories in different age, gender and elective groups but significant differences are identified between the Chinese and English courses. To analyze the significance of the difference between the mean subscale scores assigned by the students in the Chinese and English Course, a t-test of independent means was applied separately to the two dimensions. Significant difference of the means was found at the .01 level for the two personal theories dimensions in the Chinese and the English Course.

In summary, two dimensions were identified within the personal theories held by Hong Kong teacher education students, viz. Traditional and Constructivist Conceptions. Analysis of the response data of Hong Kong student teachers leads to the speculation that there was possibly a range of conceptions held, from extreme Traditional to extreme Constructivist, with a mixed proportion of the two conceptions in between for some of the student teachers. The results could also be interpreted in terms of the influence of the traditional Confucian-heritage culture of the Chinese and the impact of western culture and philosophy due to the unique position of Hong Kong and the multiculturalism developed within the place.

There are no significant statistical relations between demographic variables, such as age, gender and fields of study with the personal theories held by student teachers. This means the personal theories held by Hong Kong teacher education students are independent of their age, gender and fields of study.

Implications

Theoretical and Pedagogical Implications

While literature and teacher education programs place value on the Constructivist approach to teaching and learning, the Hong Kong teacher education students in this study are not inclined entirely towards constructivism in their personal theories. This study speculated

several types of personal theories held by Hong Kong teacher education students. Their personal theories range from the Traditional Conceptions in one extreme to the Constructivist Conceptions in the other extreme, with various proportions of the two conceptions between. This is further supporting evidence that student teachers' beliefs may not be easy to change. Many of their inherent beliefs are shaped (possibly due to their former school experiences of observing their teachers' classroom practices) before they attend teacher education programs. If their previous beliefs are strong (e.g. control class before teaching, students have to keep quiet in attending class), then even though they learn that constructivism is good for students' learning, it is difficult for them to accommodate the Constructivist Conception. Another obstacle which inhibits change in student teachers' beliefs or conceptions is that the student teachers are usually in the "survival" stage of professional development. Teacher education students are mostly concerned about class management problems and the teaching schedule they are required to complete within the teaching practice period. Therefore, teacher education students tend to choose the "safe" way for their class teaching. This includes maintaining classroom order and transmitting as much knowledge as possible to the students (conceived as a means to complete the teaching tasks listed in the schedule) in order to satisfy the requirement of the supervising lecturers and regular teachers. "Control class before to teach" / "Keep class under control". Only when teacher education students feel secure will they attempt new approaches and allow students freely to explore with little teacher intervention. Teacher educators therefore have to provide student teachers with experiences of success on attempting the new approach or adopting the Constructivist Conceptions in their teaching. Teaching practice should not be seen as a threatening event to the student teachers before they are willing to accommodate new changes in their existing beliefs and conceptions. Therefore, there are always practical problems to be considered and solved before obvious and great changes in student teachers' conceptions (and hence their personal theories) are possible. As well, tradition and cultural factors may be influencing factors in shaping the personal theories of student teachers. Teacher educators and programme designers have to take teacher education students' prior beliefs and conceptions into consideration in the planning and provision of teacher education experiences if they wish to bring about changes within their students.

Implications for Further Research

The developed instruments used in this study cannot be claimed to be perfect. The instrument can still be further refined and further developed to meet the requirement of different cultural contexts. The instrument for measuring personal theories in this study can be considered as a base or framework for future development, more research can be conducted in this direction, making cross cultural comparative studies possible, eventually.

Therefore it would be interesting to conduct similar studies of personal theories with samples from other countries and attempt a cross-cultural comparative study. Subsequently, a better understanding of the cultural and social contextual influences on the personal theories of student teachers in different countries may be achieved.

As reported previously, no single effect of age, gender and fields of study was found on personal theories held by the Hong Kong teacher education students. More research on this aspect has to be done before confirming the effect. Another possible direction of research is to study the interaction effect of certain demographic variables, e.g. age and gender, gender and fields of study on personal theories separately by means of MANOVA. Such a study is more complex and an adequately large sample size is necessary for multivariate analysis.

Other variables that can be considered in future research of include the educational background of the students- since education is speculated to exert an influence on the

development of individual personal theories. Variables such as the length or duration of education, socio-economic status of the students (with parental education level and occupation) may be interesting and rewarding in further research in this area.

To provide a better understanding of the nature of personal theories, one issue of interest in future research may be the stability of the construct. Longitudinal and/or cross-sectional studies of student teachers' personal theories may be conducted to examine the following issues:

- a. are there any changes in personal theories as students progress in their study within the programme/courses;
- b. what kind of changes in personal theories, if any, are there in the students' progression of study; and

(c) what factors may influence change of personal theories.

Close to this, comparative studies of teacher education students of pre-service and in-service courses may also be conducted to study the effect of different entry characteristics of the students (such as maturity and teaching experiences) on personal theories. Such studies could investigate the impact of previous teacher education experience acquired in the field on their personal theories and changes.

Any changes in conceptions and personal theories about teaching and learning as student teachers progress in their study may be identified and recorded. Together, the impact of teacher education experiences (the teacher education programme and teaching practice/practicum experience) on the students' personal theories could be examined. For Hong Kong teacher education students, such studies may also be done to consider the impact of changing culture and philosophy on changes in conceptions and personal theories after the return of sovereignty of Hong Kong to China.

Generally speaking, there remains much to be uncovered in the domain of personal theories about teaching/learning. This study only serves as part of a continued attempt in this underdeveloped area of research to clarify issues. More is required in order to develop a deeper understanding of the area, which eventually should prove invaluable to the future development in teacher education research and an improvement in teaching and learning.

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