An Inquiry into Components of
Teachers' Practical Knowledge in Chinese Schools*

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Traditionally school teachers have been considered as lacking knowledge of their own. They were regarded as consumers of knowledge created by university researchers outside their practice. With the increasing call for teachers to assume a role as researcher in recent China, more and more research has been conducted into the knowledge of school teachers. This paper discusses a research project on school teachers' practical knowledge. As one of the many reform strategies, the research is conducted by a collaborative team of university researchers and school teachers. The purpose of the research is to empower school teachers by identifying and acknowledging a special kind of knowledge of their own. By way of classroom observation, interviewing and document analysis, the team finds that teachers' practical knowledge can be conceived as composing 4 major components. 1) Subject: the owners of the practical knowledge are teachers instead of academics. 2) Problem situation: teachers are confronted with a puzzling problem to be solved. 3) Reflection-in-action: teachers need to take measures to solve the problem in order to obtain an "experience" in Dewey's sense. This experience relates "doing" to "receiving" (interactive), and will guide teachers' teaching in the future (continuity). 4) Beliefs: although practical knowledge is embedded within the whole "experience", it can be distilled into a belief which will be subsequently verified by teachers' actions and will direct their follow-up actions.

1 Background of the Research

Accompanying the increasing understanding regarding the complexity of the teaching profession, and together with the application of research findings of cognitive science in the field of education, the 1980s saw a transition in the study of teacher education from teachers' external behavior to teachers' thinking, and from "what teachers do" to "why they do so" (Freeman & Johnson 1998). Research on teachers' thinking, judgment and decision-making has indicated that

teachers' conception of teaching largely depends on what "knowledge" they have, how they use the "knowledge" and how they acquire the "knowledge". To categorize "teachers' knowledge", researchers have adopted different approaches, ranging from two to seven kinds (Fu 2001; Shen 2002; The Education Department of the Ministry of Education of China 2001; Ye 2001). With the aim of identifying the fundamental components of "teachers' practical knowledge", this paper focuses on the dichotomy between theoretical knowledge and practical knowledge. It will then focus on the contents and structure of teachers' practical knowledge.

This paper maintains that teachers' "theoretical knowledge" refers to the set of knowledge that can be learned by reading and attending lectures. It includes knowledge about subject matters, pedagogical contents, curriculum, as well as educational and psychological theories. Teachers' "practical knowledge" refers to the set of knowledge actually used and/or represented (explicitly or implicitly) in teachers' practice. This knowledge includes contextual knowledge, case-related knowledge, strategy knowledge, knowledge about learners and self, as well as the principles by which teachers understand, interpret and apply "theoretical knowledge". Taken as the "espoused theory" by teachers in accordance with external criteria, theoretical knowledge is mainly contained in teachers' thoughts and words, whereas the latter, the "theory-in-use", is truly believed and practiced by teachers in their work, embodied in their actions, and directing their thinking and behavior (Argyris & Schon 1974).

2 Definition and Contents of Teachers' Practical Knowledge

Various researchers have defined teachers' practical knowledge differently. Some use the term "teachers' personal practical theory", which covers almost all educational ideas a teacher holds. The definition is so inclusive that it includes whatever ideal and realistic, contextual and stable (i.e. beliefs in education or personal educational philosophy), implicit and explicit. However, when compared to "ideas of education", this concept stresses singularity and practicality, and it is what teachers truly believe, practice, and enact in teaching. "Teachers' personal practical theory" is a complex system composed of a myriad personal understandings of education, which are organized psychologically and not necessarily logically (Corrigan & Haberman 1990; Ju 2004). It is not something learned or taught independent of teachers. Rather, it is the sum total of teachers' experience, embedded in their previous experiences, present life, and future plans. It dominates their practice, helps them live in the present, as well as reconstruct their past and future (Connelly & Clandinin 1988; Connelly et al. 1996).

Other researchers use the term "teachers' personal theory" to describe teachers' practical knowledge. They claim that this type of knowledge has the following features. 1) It is a theory for practice, emerging in the process of teachers' inquiry, and aiming to clear up the relationships between major events in the process of their action. 2) It is an action theory which relies on the actors' concepts, categories and language, and represents the meanings and logic of teachers' actions. 3) It is context-specific, derived from teachers' inquiry into teaching in a particular time and place, and by particular agents. It only offers insights into and alternative solutions to similar cases. 4) It is personal knowledge, reflecting teachers' personal wishes. But it goes beyond the binary opposite between subject and object because it is independent of individual needs. 5) It is indefinite and incomplete, and thereby open-ended. It originates in questions, and ends up in questions, for it is falsified and amended in action, thus open to new possibilities (Liu 2002).

Elbaz (1981), a pioneer in the study of teachers' practical knowledge, views it as a special knowledge acquired by teachers in a unique manner; it is characterized by practice and social situations, and it is highly experiential and personalized. This knowledge encompasses all that the teacher knows about students, class, school, social environment, subject matters, theories of child development, learning and social theory as integrated by the individual teacher in terms of personal values and beliefs and oriented to his/her practical situation. Elbaz (1983) identifies five orientations of practical knowledge, i.e. how practical knowledge is held and used. The five orientations are situational, personal, social, experiential and theoretical. Based on their empirical studies on practical knowledge of subject teachers, Verloop et al. (2001) consider teachers' practical knowledge as the knowledge and perceptions underlying teachers' practices, as well as the knowledge and beliefs implicit in teachers' actions.

This paper adopts the term "teachers' practical knowledge", for two reasons. For one thing, teachers' practical knowledge is not all about singularity and uniqueness. It has a certain degree of generalizability with moral norms. Although this knowledge is mostly tacit, it can be understood, which means it is accessible, communicable, transferable, and learnable by conscious efforts. Additionally, this knowledge is closely associated with practice, and practice is definitely value-laden. As a normative activity, teaching is expected to influence students in a positive and proper way. In this sense, teachers' practice is important not only cognitively and behaviorally, but also in transmitting cultural heritage, offering moral guidance, maintaining social norms, and exerting affective impact. Therefore, teachers' practical knowledge should contain normative meanings implied in such concepts as "ideal", "belief", and "attitude".

Furthermore, the concept of "knowledge" is broader than "theory", and thereby more inclusive to contain "knowing, understanding, interpretation, opinion, perspective" or even "competency", which are not consistent, rigorous or "logical". Although traditional epistemology only regards "propositional knowledge" as "knowledge", new trends have come to accept "competency-based knowledge" (Pojman 2008). Actually, the traditional definition of "knowledge", i.e. "beliefs resulting from the accurate understanding of the external world by the cognitive subject", can also be enacted. For example, in research on teachers' practical knowledge conducted by The School of Education at Peking University, researchers have identified several types of competency-based teachers' practical knowledge. These have been obtained through cooperation with teachers, and were based on an analysis of their native concepts emerging form the first-hand data, such as formulating a "class eye",[†] making use of passion, the "run-through ability",[‡] perceptibility, the ability of appreciation, and approachability. Based on the findings, the research team proposed the notion of "knowing competency" in accordance with Dewey's view of "knowledge". Dewey (2005) believed that knowledge is the outcome of operation by which a problem situation is turned into a problem-solved situation. What is revealed by knowledge is not a priori existence (as argued by empiricism) or essentiality (as suggested by rationalism), but a result of conscious doing. Knowing is an activity to change what is pre-existent, whose value lies in the results of changing the pre-existent. That

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[†] "Class eye" is a native concept used by some senior teachers in China, indicating an almost perfect learning atmosphere when students' prior knowledge and motivation to learn, teachers' passion for and tact of teaching, and the learning contents are all synchronized in a harmonious and rhythmic manner, which spins students' learning into depth like the eye of a typhoon.

[‡] "Run-through ability" is also a native concept used by some Chinese teachers, meaning teachers' ability to link various kinds of knowledge from different sources, different times and locations while teaching a specific knowledge so as to help students understand it in a more holistic and connected way.

accounts for the possibility of doing before knowing, and of knowing from the result of doing. Or to put it more extremely, knowledge and action are inseparable, like two sides of the same coin.

After elaborate discussions and field research, the team has proposed a preliminary working definition of teachers' practical knowledge, i. e. teachers' understanding of teaching based on reflection on and revision of their teaching experience. Teachers' attempts to interpret their own teaching experiences gives birth to experience, which, after being reconstructed by reflection, develops into general principles with a certain value orientation, and directs teachers' routine actions in teaching. That is how teachers' practical knowledge is developed.

Opinions polarize among researchers as to how to categorize the contents of teachers' practical knowledge. According to Elbaz (1981), practical knowledge consists of five components: 1) knowledge of self, including self as resources, self in relation to others, and self as an individual; 2) knowledge of milieu, i.e. classroom, the political and social environment; 3) knowledge of subject matter; 4) knowledge of curriculum, including curriculum development, organization and evaluation; 5) knowledge of instruction, including theory of learning, students and teaching, teacher-student relationships. Verloop et al.'s (2001) categorization of practical knowledge in teaching reading was similar to that of Elbaz's.

Early in the research, the research team at Peking University proposed six categories of teachers' practical knowledge: teachers' beliefs in education, knowledge of self, interpersonal knowledge, contextual knowledge, knowledge of teaching strategies, and knowledge of critical reflection. However, as the research progressed further, not only have many native concepts of teachers emerged, but also researchers' understanding has evolved. This has led to changes in the categories of the contents of teachers' practical knowledge. New dimensions have been identified such as the relationship between teachers "being", "doing" and "becoming", between teachers' knowledge of self and knowledge of subject matters and students, and between teachers' self identity and their linguistic expressions and mind. Under these broad relation-oriented themes, there are teachers' native concepts (which are emic) and the researchers' analyzing concepts (which are etic), as well as interactions between the two. For instance, under the first theme mentioned above, we have identified teachers good at revealing their knowledge, teachers good at keeping students in suspense, teaching by drawing upon interpersonal relationships, constructive thinking leading to change in teachers' understanding of students, teachers' ability to reflect and their reflective levels. It is certain that the definition and contents of practical knowledge will change continuously with the advancement of the research project.

3 The Fundamental Components of Teachers' Practical Knowledge and Their Representation

At present, in terms of definition and representation of teachers' practical knowledge, more focus has been on its forma as a static product rather than as a dynamic process. Discussions on how this knowledge is enacted and generated in specific situations are especially rare (Li, 2009). Elbaz (1983) argues that a hierarchy can be used to organize teachers' practical knowledge, such as rules of practice, principles of practice and image (i.e. general and metaphorical statements). The combination of these elements shape a teacher's "cognitive style", that is, what accounts for the consistency and continuity of a teacher's actions. However, Elbaz's research does not clearly reveal how these elements are displayed in specific teaching situations and how they are generated and evolved.

The research team at Peking University has obtained some preliminary findings based on a large number of class observations, in-depth interviews and case analysis. We believe that teachers' practical knowledge should include at least 4 elements (Fig. 1). 1) Subject: the owners of the practical knowledge are school teachers rather than academics whose major task is to produce formal theories. 2) Problem situations: teachers are confronted with a puzzling problem to be solved. 3) Reflection-in-action: teachers should take measures to solve the problem in order to obtain an "experience" in Dewey's sense. This experience relates "doing" to "receiving" (interactive), and will guide teachers' teaching in the future (continuity). 4) Beliefs: although practical knowledge is embedded in the whole "experience", it can be distilled into a belief which will be subsequently verified by teachers' actions and will direct their follow-up actions.
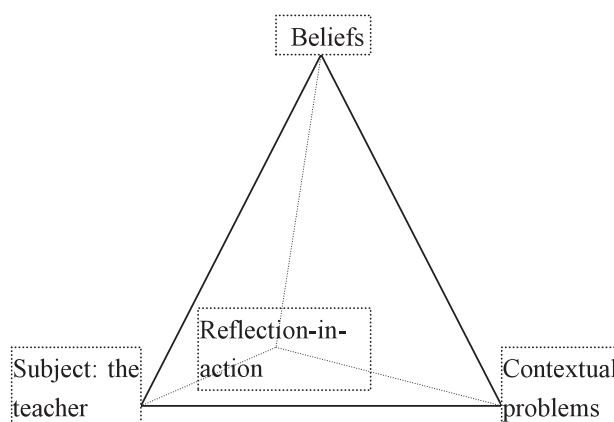

Figure 1   Major Components of Teachers' Practical Knowledge

To illustrate the definition above, we use the example of a high school geography teacher.[§] While teaching the scattering phenomenon of light to a class of first-year high school students, the teacher first relied solely on lecturing to explain the theory of how light scatters in the atmosphere to light up the classroom. She wrote the theory on the blackboard, and then asked students questions. Some students in the front rows responded, but those sitting in the back were obviously not paying attention, with some sleeping and others doing their own business. Later the researchers who observed the class asked the teacher whether there was any way to get students more involved.

Later, in another class of the same grade, the teacher turned off the lights first, and then asked the students, "In a classroom without natural light, if the lights are turned off, the room is supposed to be dark, because there is no light source. But now the room is still bright, and just the brightness decreases a little. Why?" At that moment, students showed strong interest in further inquiry. Guided by the teacher, they participated in group discussion, and then answered the question. Compared to the previous class where the teacher lectured the entire time, the students in this class were more engaged, and the "underachievers" were especially active. After the class, when asked why she chose to turn off the lights first, the teacher said that it could create a thought-provoking situation, encouraging the students to look for the light source in the classroom. The students were invited to discover the invisible air molecules, the scattered light, with their own

eyes and by their own thinking. In this way, the action of turning lights off carries important educational meaning, i. e. letting students discover by themselves.

The teacher concerned thought that the practical knowledge exhibited in this case for her is: students' discovery = perceptible learning situation + teacher's questioning. This formula looks similar to the principles of "initiative, cooperation, exploration" promoted by the new national curriculum in China. But they are different in that this one is context-specific, inspired by a problem that the teacher encountered, and formulated in her attempt to solve the problem. More importantly, it is rooted in the teacher's personal experience, which helps to capture a bottom-up understanding (i.e. "the theory-in-use") from inside, rather than the "espoused theory" imposed top-down from the outside (Argyris et al. 2000).

This experience-based formula generates methods applicable in other situations of teaching. For example, when teaching dewing, teachers can put a bottle of iced mineral water in the front of the classroom (perceptible situation), ask questions and invite students to give plausible explanations about it. While geography teachers can apply this formula to questions which call for explanation of natural phenomena, teachers of other subjects can also adapt and apply it to their own situations.

The example above illustrates the four major components of teachers' practical knowledge in the research team's argument.

1) The formula "students' discovery = perceptible learning situation + teacher's questioning" stems from the teacher's practice. It belongs to the teacher, and is imprinted with his or her personal characteristics. Although theorists may consider this formula more as action steps or strategies than "knowledge" due to its inadequate abstraction, the teacher may consider it easy to use and to apply in other similar teaching contexts.

2) The teacher encounters the problem situation. Here teaching was situated in a geography class for first-year students in a key high school of a metropolitan city. The first group of students, especially the "underachievers", was not actively involved when the teacher primarily lectured the class. At that time, the teacher was working together with a group of university researchers on teachers' practical knowledge. The researchers were doing classroom observation, followed by an interview about her teaching. The talks between the researchers and the teacher encouraged the teacher to think more about how to help students understand better, and more importantly, how to get all students involved to understand the theory in relation with their life experiences and by firsthand observation.

3) The teacher reflects in action. The purpose of switching off the lights and ask questions is to create a situation where "students can make discovery by themselves". The idea of "allowing students to discover by themselves" had been repeatedly presented to the teacher in her previous training courses and books on the new curriculum reform. But it did not become a permanent part of her belief until she was engaged in a real-life situation where she faced a problem, attempted to solve the problem, and eventually, obtained the "experience" that resonates with her. In this case, she first relied on lecturing to explain the scattering phenomena, and students were passively involved in learning. She took students' passivity and the questions raised by the outside researchers as "talkback",** and took measures (i.e. to switch off the lights) in response. By "reframing"

** The term "talkback" is used by Donald Schon in his well-known book *The Reflective Practitioner: How Professionals Think in Action*. In my understanding, it is different from the more usual word "feedback" in that it is more active and direction-free. "Feedback" may be bound by the previous action or speech, while "talkback" seems more actively engaged in a joint inquiry.

the problem rising from the teaching situation, she discovered a better way of teaching, which later proved more effective for student learning (Schon 2007).

4) New beliefs build up. Originally, the teacher believed that a teacher should explain theories at length, and write all the important points on the blackboard to facilitate students' memorization (mainly in preparation for examinations). After engaging in a process of reflection-in-action, she developed a new belief, i. e. "perceptible learning situation + teacher's questioning = students' discovery". This belief would be reinforced once the teachers reviewed the problems, and took new actions which were later proved correct and effective. Afterward, the teacher would actively experiment with the belief, for example, transferring it to the teaching of dewing. As a result of this process, the teacher confirmed not only a method but also the overall situation for action or even experience. More importantly, the experience enabled the teacher to ascertain her inner beliefs, which were tested and proved effective in practice, by "allowing students to discover by themselves". Such experience originates in experience, but also transcends experience.

The four major components discussed above interconnect with each other and must appear in a "package". Unlike theoretical knowledge, which is independent of contexts, actions and direct experience, this kind of knowledge does not appear in pure proposition or logic, and is not always articulated. It has to be experienced by teachers themselves. Although teachers' practical knowledge is still defined as "belief", this belief must work side by side with the other three elements to make any sense as a whole.

First of all, "subject", one of the major components of teachers' practical knowledge, has double meanings. On the one hand, it connotes that this knowledge is a self-owned experience gathered from practice. Unlike theoretical knowledge, which can be learned indirectly by reading, attending lectures or receiving training, this kind of knowledge requires, in order to gain "experience", that a teacher *be there*, personally living through the problems and the solutions to understand his/her approach to problem and its effects, thereby enriching his/her "repertoire". On the other hand, as subject, each teacher is *unique* with his/her own life history, experiences and beliefs, so that their representations of the same kind of practical knowledge are likely to be different.

Secondly, teachers' practical knowledge is situation-dependent/specific. Since it is displayed in the problem-solving process, it cannot be isolated from the teaching contexts. In fact, the context forms part of this knowledge. Generally, not until teachers need to solve specific problems when facing students, who are "the great thing" (Palmer 1998), will they display their own unique judgment, action power and insight into their own teaching. This dependence on situation calls for educational narrative and case study, rather than theoretical discourse to represent this knowledge.

Thirdly, "reflection-in-action" shows teachers' distinctive ways of thinking, judging and decision-making as professionals. It is dynamic, flexible and ever-changing, revealing characteristics of knowing-in-action. In contrast to theoretical knowledge, which is fixed, static, certain and accurate, the knowledge generated by reflection-in-action is competency-based, embodied, reflexive and formative. In addition, unlike theoretical knowledge, which relies on pure speculative logic and is relatively unconcerned with action steps, procedures and immediacy (Dewey 2005), teachers' actions are immediate when the situation calls for prompt solution. Teachers' practical knowledge reflects the logic of action.

Finally, teachers' practical knowledge as "beliefs" requires them to review and renew it in terms of truthfulness or usefulness in the follow-up attempts to solve problems. So it is a process of dynamic creation and constant enrichment. While theoretical knowledge, whose verification is

done by examining already existing, context-free concepts, practical knowledge requires that teachers consider their beliefs in a new situation, and, if necessary, adjust and amend them. This is exactly what is meant by "Education is a constant reorganizing or reconstructing of experience" (Dewey 1990).

4 Understanding the Features of Teachers' Practical Knowledge in Terms of Its Fundamental Components

The research team at Peking University has singled out the above components—subject, problem situation, reflection-in-action and belief—on the account that they largely encompass all the important features of teachers' practical knowledge. To better illustrate its differentiating features, the following analysis of teachers' practical knowledge will be made in contrast to theoretical knowledge.

1) The subject: The subject of the teachers' practical knowledge is teachers, who possess their own unique knowledge. Unlike theoretical knowledge, which is owned by academia, and used by teachers (as is often suggested in such popular sayings as "Linking theory with practice"), teachers' practical knowledge comes from their own practice, and directs their actions. It is both personal, revealing teachers' individual political ideologies, cognitive interests and teaching styles, and collective, capable of collective management by classifying and integrating its generic parts (Chen 2002).

2) The problem situation: Teachers' practical knowledge is usually displayed in problem-solving contexts, so it is value-based, situation-specific, and laden with background information. Firstly, it seeks meanings and the common good in education, as it is for the "benefit" of students. By contrast, theoretical knowledge does not respond to ethical demands, and is strives to be as objective and neutral as possible.

Secondly, practical knowledge mirrors teachers' "local knowledge" (Geertz 2000). In contrast to theoretical knowledge, which is free of the concept of space-time, or when and where it is produced, teachers' practical knowledge cannot be generalized as "grand theory" to function universally. It can only be generalized to some extent (otherwise it would not offer any guidance to similar contexts). It is more like Merton's "middle range theory", confined in use and limited in space and time (Yang 2001).

In addition, teachers work in complex situations with existing available resources, motives/agents (significant events and people) that activate this knowledge, and various conditions contributive to its development (e.g. teachers' life history, school culture, teachers' colleagues, and the intervention of outside researchers). These factors need to work together to encourage teachers to discover "problems" once taken for granted, and to aid in the development of their practical knowledge. In many cases, acquisition of this knowledge resembles sudden enlightenment. In this process teachers, have long been so immersed in a problem that they have become part of the problem. Then, an unexpected opportunity begins a process of feeling and reflecting. Such a combination of various necessary conditions is exactly the social construction process of teachers' practical knowledge.

3) Reflection-in-action: Although teachers' practical knowledge can be expressed linguistically in proposition, it is, by nature, embodied, enacted and tacit. It comes in the form of teachers' reflection in action, treating unfamiliar problems by "seeing-as" and "doing-as" something familiar, discussing the situation, receiving talkback from students and researchers, reframing the prob-

lem, and monitoring their own actions reflexively using practical awareness (Giddens 1998). In this sense, teachers' practical knowledge can be viewed as a combination of "propositional knowledge" and "competency-based knowledge". In contrast, theoretical knowledge, which can only be expressed in propositions, is a set of explicit statements made in language, and not necessarily enacted.

Although teachers' practical knowledge is mostly inarticulate, it is still explicit and understandable. It is what Micheal Polanyi (2000) defines as "subsidiary awareness" that supports and directs teachers' actions, i.e. "focal awareness". Without subsidiary awareness, focal awareness cannot work. So, the more elaborate and coherent the former is, the more powerful, distinct and accurate the latter. In this way, teachers' practical knowledge plays an indispensable role in their actions, though it is not articulated most of the time.

4) Belief: Teachers' practical knowledge can be defined as "beliefs built on the correct understanding of external things" in accordance with the traditional definition of "knowledge", and "beliefs that have to be enacted" by considering the features of "competency-based" knowledge. These beliefs are formed in teachers' practice, and verified as "true" by the outcomes of their actions. It should be pointed that being "true" here is used in the pragmatic sense, i.e. the knowledge is "useful" to its user. This "truth" is different from the consistency between propositions and empirical facts as asserted by the "correspondent theory". Nor is there relevance between parts of a truth as argued by the "coherence theory", which believes that the parts of a whole are related to each other by logical necessity and with probabilistic consistency (Hu 2006).

Truth in pragmatism means that a belief is true when it is useful or good for a purpose; truth has practical meanings, and its value is to achieve the purpose of an action. Hence, while we adopt the traditional definition of "knowledge", we also need to turn to Dewey's (2005) pragmatic definition as the result of an event by which a problem situation turns into a problem-solved situation. This understanding of knowledge requires us to look "forward", not "backward", while theoretical knowledge can only be propositional, and "backward looking". Actually, both empirical and rational epistemologies regard "knowledge" (analogous to "theoretical knowledge" discussed here) as confirmation of a reality or essence that already exists.

An attempt to define the components of teachers' practical knowledge can partly clarify the use of this concept in our research; for example, whether it is equivalent to "experience" or to "competency".

The research team maintains that use of the concept of "practical knowledge" is not only for purposes of better communication with overseas researchers (who are using this concept in similar studies), or to empower teachers (since possessing "knowledge" is often seen as more academically prestigious than "experience" and "capability"),[††] but more importantly it is to verify its theoretical legitimacy. Teachers' practical knowledge is not "experience" in the general sense, nor in Dewey's sense. Rather, it comes from experience yet transcends experience, for it has certain generalizability due to abstraction at a higher level. Experience contains practical knowledge. Or in other words, practical knowledge comes from experience, but not vice versa. Experience is concrete, but practical knowledge is relatively abstract. Experience is lived, while practical knowledge is believed as well as enacted.

[††] We may say that knowledge is based partly on experience, and capability is the demonstration of both knowledge and experience. We cannot have one without the other. However, in Chinese academic and practical fields, knowledge is considered higher in quality and prestige than experience and capacity.

Furthermore, practical knowledge is not the same as "competency". Competency is shown in teachers' behavior, strategies, and actions, but not in their beliefs. According to Kathergan's (2004) Onion Model (fig. 2), beliefs rank the third immediately after "mission" and "identity", while "competencies" follow in the fourth ring after "mission", "identity" and "beliefs". The same kind of competency may come from different beliefs, and similarly, the same belief may well express itself in different kinds of competencies. Practical knowledge as belief encompasses both "experience" and "competency", and calls for the interaction between "subject", "object" and "situation" to function.
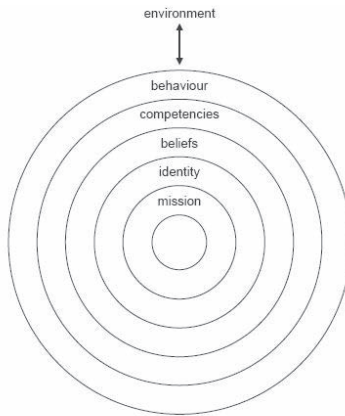

Figure 2   Kathergan's "Onion Model"

To define teachers' practical knowledge as beliefs also helps encourage "double-loop learning" (Argyris et al. 2000) (fig. 3), which will promote teachers' professional development more effectively. Double-loop learning is rather different from single-loop learning. In the latter, teachers, upon completing an action, usually adjust the action per se if they find the result unsatisfactory, whereas in the former, teachers will go back not only to the action strategies, but to their "governing variables", i. e. "dominant values" or "beliefs". If teachers reflect and revise their beliefs while adjusting their actions, the overall change they undergo will undoubtedly be more complete, profound and enduring.
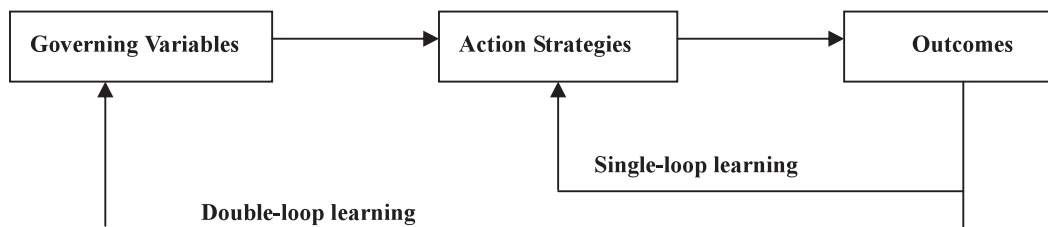

Figure 3   Single-loop Learning and Double-loop Learning

5 The Generative Mechanism of Teachers' Practical Knowledge

In light of the above discussion, the questions that might be asked are how do these components relate to each other dynamically in teaching practice, and how does this active interaction in turn help to generate teachers' practical knowledge? Simply put it, teachers' practical knowledge is generated as follows (fig. 4).

1) There is practical knowledge (PK) that teachers hold before actions. Originated in teacher's previous experience, PK can be explicit and articulate, but it is mostly tacit. It is personalized, and enacted in action, representing the "theory-in-use" that directs teachers' action, not their "espoused theory". PK covers such areas as subject matters, students, instruction, interpersonal relationships and teachers' self-concept. The major themes could be "the run-through ability", "formulating a teaching eye", "building rapport" and the like. PK is usually represented in such forms as images, metaphors, anecdotes and cases.

2) Teachers encounter a puzzlement or tension when they are caught in a problem situation. At these times PK is activated, perceived and becomes explicit. Additionally, teachers realize that their previous PK does not work any more and is in need of adjustment and improvement.

3) Teachers reframe the problem situation through reflection-in-action, or conversation with the situation (including students, researchers, the problem per se, and the environment). In this process, the media available to teachers for the socio-cultural reconstruction of their PK are: students, colleagues, the learning community, artifacts, brokers (e.g. teaching advisors), books, information, life events, inner persuasive discourse and authoritative discourse.

4) There emerges a new practical knowledge (PK'). It is a different form of knowledge, renewed after reflection-in-action, and a belief verified by the effect it has exerted on teaching. Though born out of PK, it has evolved, and will continuously change and develop as the situation calls upon. In addition, different teachers may draw on PK' when they are in similar situations, but due to their differences in personal traits, life experience, education background and so on, the individual teacher as subject will still be able to innovate and develop it in its application.

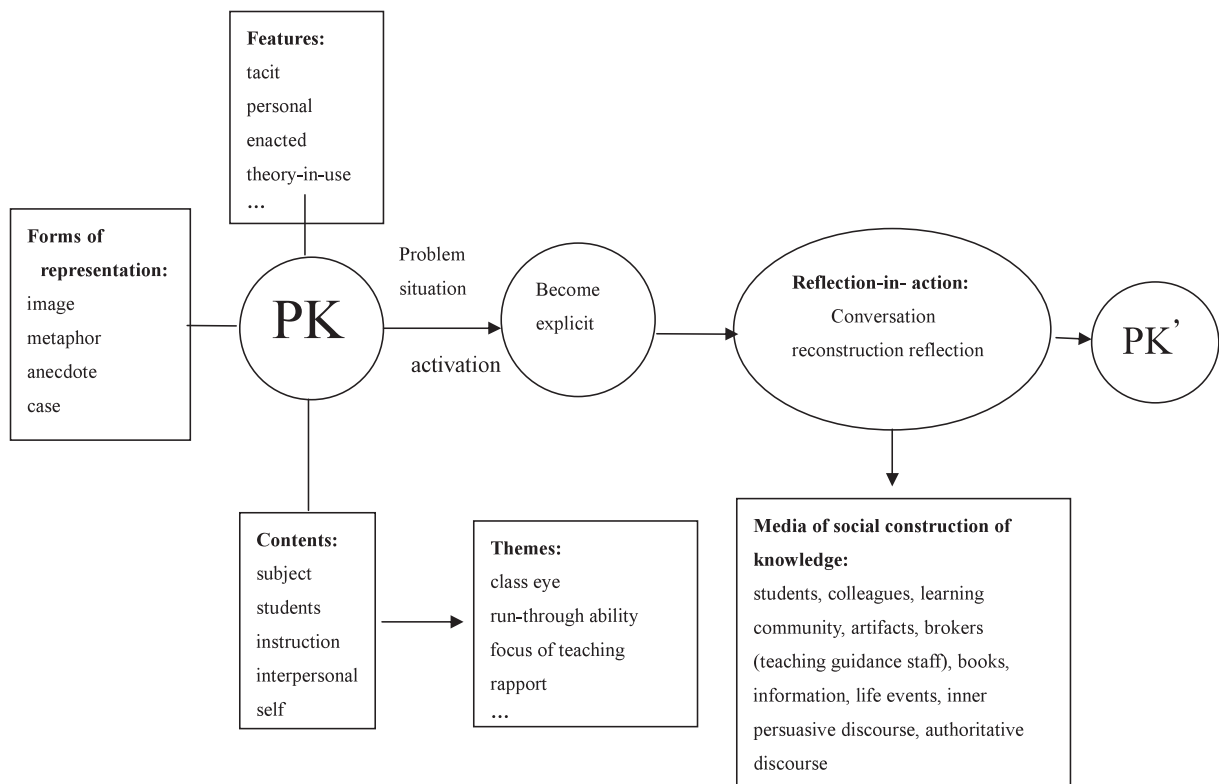In conclusion, teachers' practical knowledge is found to have 4 major components as illus-

Figure 4   The generation of Teachers' Practical Knowledge (PK and PK')

trated in Figure 4. The development of the PK' from PK requires not only teachers' own individual endeavor, but also the social construction of teachers' community of practice. By far, some of the contents, forms of representation, features and major themes of teachers' practical knowledge have been identified by the research project. However, more work needs to be done. For example, what is the typical spectrum of contents, themes and forms in teachers' practical knowledge? Are there or what are the differences in teachers' practical knowledge by gender, by subject matter they teach, by age, by professional development stage (novice, experienced and expert teachers), by levels of schooling (primary, secondary and high schools), by kinds of schools (high, median and low quality schools), by region (economically well-off and disadvantaged regions), etc.? How teachers themselves view their own knowledge? Are there any differences between their views and those of academic researchers? It is obvious that more systematic and in-depth research needs to be conducted into these questions if we want to understand teachers' profession in general and their knowledge in particular.

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