



Re-structuring In-service Teacher Professional Development: Focusing on Pedagogical Content Knowledge

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Thinking about re-structuring in-service teacher professional development (TPD) is not new in either the Indian or the global context. The vision of setting India's destiny in her classroom articulated in the National Commission of Education Report 1964-66 (NCERT, 1968) shows the nation's expectations from the classroom. To make the expectation a reality, there have been several efforts made at multiple levels. One area of concern that strongly emerges is improving the state of teachers' professional development both at pre-service and in-service stage (NCTE, 2009). There is no doubt that the lack of adequate logistic and human resources negatively impact the quality and effectiveness of the In-service teacher training. However, I claim that this is only one version of the story.

To unearth the other version, it is important to ensure our understanding about teaching as a profession and the professional needs of a teacher. Shulman (Shulman, 1986; Shulman 1987) has written in detail about knowledge base for teaching profession. He also talked about how the professional development programmes fail to address these elements with care and wisdom. According to him, a teacher's knowledge base can be divided into three major areas: content knowledge, pedagogical content knowledge (PCK), and curricular knowledge (Shulman, 1986).

In this paper, I will first make an attempt to unfold the meaning of PCK, the elements of PCK, and their implications in structuring in-service TPD, and finally some suggestions to ensure PCK in in-service teacher professional development program.

What is PCK?

Pedagogical content knowledge, or PCK, is neither only content knowledge nor only pedagogical knowledge, though both these knowledge domains are equally important for teachers. PCK is knowledge of pedagogy for a particular content (Shulman, 1986).

According to Cochran and her colleagues, pedagogical content knowledge is a type of knowledge that is unique to teachers, and in fact

is what teaching is about' (Cochran, DeRuiter, and King, 1993). Most of the policy discourse and curriculum of teacher education assumes that having general pedagogical knowledge and content knowledge is sufficient for teaching in a classroom and there are some clues in support of existence of such ideas.

For example, in in-service teacher professional development programmes the trainers of the program are usually selected on the basis of their academic qualifications and the level they are teaching. More, specifically, a master trainer would have higher degree in, say, general psychology (or any other subject) than the participants. Another manifestation of such ideas is sending the teachers to institutes of higher studies as part of a refresher course to enhance content knowledge. These components have value in their own area, but are of limited use for teachers in the classroom.

The concerns raised by practicing teachers in in-service teacher professional development platform echoes the need of integrating pedagogical content knowledge with the programme. From my personal experience, I have observed that teachers ask for suggestions on strategies so that students can perform activities and develop capabilities such as reading, writing, comprehension, problem solving in mathematics, or be able to answer questions posed to them. Even teachers would ask for strategies that would enable their students to perform better in examination. Some teachers would have challenges at a more rudimentary level, as for example, how to teach reading, writing, and basic operations in mathematics to the students.

At the next level, teachers ask for specific pedagogic strategies to teach a particular concept to a group of students: for example, a teacher might want to know how children could be made to understand concepts of fraction, Newton's laws of motion, evolution, living and non-living things, moles, motion of planets, global warming, pollution, weather and climate, colonialism, neo-liberalism, conflict to name some. Responding to these questions is not possible from expert

understanding of education or of the subject alone - an expert in the theory of relativity or quantum mechanics will not be necessarily able to tell the ways we can teach Newton's laws of motion to the students at the middle school level. Similarly, an expert in cognitive psychology might not be able to suggest the pedagogy for the same.

Elements of PCK and their implications in in-service TPD

PCK can be divided as having three components. One is the ways of representing the subject or content so that students can comprehend. Interestingly, there is no single way of representation of a particular content. Therefore, the teachers must have a repertoire of several forms of representation. Knowledge about these forms can be gathered from research literature and the "wisdom of practice" (Shulman, 1986; p: 9). Here, practicing teachers are in better position than teacher-students in pre-service programme in terms of having rich wisdom of practice.

The second element is the teacher's understanding of the existing ideas of the students about the content of the particular topic in question. A bulk of research has been conducted around the world and documented in the last forty years which shows that students of all age, teachers, and teacher educators have several alternative conceptions. These alternative conceptions are universal in nature and difficult to eliminate through traditional teaching. Some of these are found through the history of the development of the discipline and even considered correct in the past. It is even more interesting that sometimes even experts hold these views (Jammer, 1962).

One way to look forward is by bringing discourse with teachers around the topic specific alternative conceptions. It is important to appreciate that alternative conceptions are present among the students of all social category. Knowledge about alternative conceptions about a particular concept point out the roots of students' errors, mistakes, difficulties, or even dis-interest to learn further.

In addition to that, having comprehensive understanding of alternative conceptions help structure the appropriate pedagogy and design assessment tasks. And this leads to third element of PCK. Third element includes designing appropriate pedagogy to address the specific alternative conceptions and build more accepted

conceptions. Here, like the first element, there is no single pedagogic intervention. A set of strategies or combination of these in a given situation can be tried out with the students.

Ensuring PCK in in-service teacher professional development program

In this section, I am proposing a model of engagement with in-service teachers in order to ensure the three elements of PCK discussed above. As I have discussed above, there are three distinct elements of PCK for a particular concept or content: (a) knowledge of multiple representations, (b) knowledge of students existing ideas, (c) knowledge of pedagogic strategies to build upon the concepts on students' existing ideas.

Knowledge about all the three elements can be constructed from research literature and wisdom of practice. At this stage, it would appear simple to conclude that these three elements need to be addressed in in-service teacher education. Interestingly, the story does not end here but begins from this point. Published research on students' existing ideas on different concepts in Indian context is limited and not always suitable for use directly in TPD programmes. One reason for this is their technical nature and, therefore, low readability and the second reason is inadequately addressing all the three elements in one document.

To begin with, while the teachers' rich classroom practice is a resource in in-service TPD, there is a limitation which is that teachers, like students, also hold multiple alternative concepts on the same topic.

Here, I am proposing a set of elements to include in in-service TPD. These elements are not independent of the structural processes we follow in the existing model of TPD but rather ask a systemic and fundamental changes in the processes too in order to include PCK in the existing TPD.

Some fundamental changes are required to be made in the in-service teacher professional development program in alignment with the nature of knowledge source for developing PCK. This can be done by constructing the knowledge base of TPD on three elements mentioned in the beginning of this section. This knowledge base can be gained from at least three sources.

One is, studying existing literature specific to a topic/concept and prepare a set of modular write

ups in a readable format for teachers and teacher educators in general. These should address the components of: (a) knowledge of multiple representations, (b) knowledge of students existing ideas, (c) knowledge of pedagogic strategies to build upon the concepts on students' existing ideas for a particular topic/concept. For example, if we have to deal with the pedagogical content knowledge for fractions in mathematics at the primary school level, we have to search literature on all the above three elements. This process can be carried out by a group of motivated teachers or teacher educators.

Once the module is prepared can be introduced to the teachers at decentralised platforms like in Cluster Resource Centre (CRC) and Block Resource Centre (BRC) levels. At this stage, the participants would discuss in detail on the modules shared with them with the participants engaging with the module in an interactive manner and taking part in the process to enrich the module, rather than be just passive receivers. In principle, unless the teachers bring contextual experience of the students and their rich wisdom of practice the module cannot be considered valid. This also demands the engagement with teachers free from rigid bureaucratic notion of discipline and creating an empowering and motivating environment to work in.

Once the teachers gain familiarity with the existing wisdom, it is crucial to test these new learnings tempered by existing wisdom and for that the teachers can carry out a set of action research on the topic and record all their learning on the three elements. Teacher educators along with two or more teachers can collaborate on one or more specific topic. The learning from the action research would be the resources for the next engagements at CRC and BRC level. Some of the learnings should be documented and presented in teacher forums.

It should be noted that this kind of quality work can only be ensured when there is a constant support mechanism accessible by teachers as well as opportunities for regular meetings on a voluntary basis. The learnings documented in this process, along with the module prepared at initial stage, would together form a basis of pedagogical

content knowledge of teachers in a particular context - a process which should be repeated in every academic year.

Conclusion

The effort of integrating PCK in in-service TPD is not new to the academic community. The recent policy discourses in Indian context and individual experiences indicate a need to situate existing TPD endeavors addressing strong elements of PCK. This article made an attempt to articulate the idea of PCK, understanding its elements, the implications of these elements in structuring in-service TPD, and finally proposed a model of TPD.

There have been efforts put in different state level initiatives to integrate some elements of PCK. E.g. the science modules prepared for in-service TPD in the State of Uttarakhand integrated some elements of PCK by integrating understanding of alternative conceptions associated to specific concepts in science (SCERT Uttarakhand, 2016). However, translating the proposed idea in totality require an overhaul in its structure and conceptualization. Integrating PCK in the TPD programmes assumes that the teachers and teacher educators possess already an expert understanding of content, pedagogy, education, and place of education in society.

The present state of school education and TPD programmes seems to constraint the proposal made in this article. One way to resolve this is looking the entire in-service TPD to enhance PCK and therefore drawing out knowledge from other domains as and when required. There is a need to make the in-service TPD decentralized, informal, regular, coherent, and relevant to the life of teachers. It is more important to leverage the opportunity of marriage across the existing knowledge base in literature, expertise of teacher educators, and the teachers' wisdom of practice. This marriage would pave the way for constructing new knowledge for the teaching community. Finally, it is important to recognize the potential of in-service TPD a step forward to form the destiny of the nation in true sense as it was envisioned in the Indian National Education Commission Report more than 45 years ago.

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