Mathematics Teacher Education in India – demanding change and reform in teachers' professional development

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Introduction

Teacher development is an extensive and thriving research arena throughout the world (Wilson and Berne, 1999). It faces multidimensional challenges as regards both in pre-service and in-service programme. The system of teacher education in India is a very extensive one, covering about 1400 teacher education institutions for primary level and nearly 700 institutions for secondary level. The system enrolls around 0.12 million trainees at primary level and equal number of trainees at secondary level. Beside this the responsibility of training 5 million in-service teachers is also of the system and this gives us the idea about the tremendous pressure of teacher training work on the system of education. Teaching in itself is a complex and tension filled practice (Adler, 2001). And hence it needs to be handled with care and sensitivity. Somehow teacher educators who are part of the systems mentioned above are lacking of such sensitivity. Professional development of teachers is a strongly discussed and debated issue of this field. Almost every conference, workshop or a teacher training is talking about the professional development of teachers. Recently I visited a conference arranged for in-service teachers (~ 150 in number) teaching in privileged schools, there most of the review speakers explained teachers how they need to be professionals. The common example used by the speakers as professionals was of “doctors”. The teachers were confused about how they are supposed to behave. Many of them became restless and asked questions which showed that they are taking some direct parallels from doctor’s profession. In reality is there anybody who teaches a doctor to be a professional? And what do we mean by becoming professional? The word explains us that one who engaged in one of the learned professions is called as professional. Like lawyer or a doctor is a professional as they have learned law and medicine respectively. I started discussing with teacher educators and experienced teachers that what do they mean when they ask teachers to become professional. Many of them gave me example of doctor's profession.

Understanding professional development

How to understand Professional development of teachers in the context of mathematics teaching? On the basis of categories of teachers' Mathematical knowledge given by Shulman, Ball, Adler, Ma I constitute the idea of Professional development of teachers teaching mathematics with following parameters - (a) understanding content of teaching (b) understanding and making use of opportunities for active learning; and (c) able to make coherence with other learning topics in the curriculum. Here the question comes to our mind is when and how this professional development is attained in a mathematics teachers' career. I am trying to address the question 'when is this attained?' in Indian context in this paper. The question of how it is attained is not addressed here. But if we recall Ma's (1999) discussion about how PUFM is attained, that is to attain the connectedness, coherence and depth Chinese teachers showed that community formation and peer learning are very essential. The functioning of school in isolation is also responsible for teachers failure to be professional.

When Professional development is attained

To see when teachers get opportunity to become professional, let us have a look at the curriculum of teacher education. Following are the topics they study in their course - Basic Ideas in Educational Theory, Educational Psychology, Modern Indian Education : Its development and recent history , Its organization and practice , Health Education, Methodology of teaching, etc. They also learn about assessment and other special education. Primary teachers take trainings for two years, called as Diploma in Education (D. Ed.) after their basic education of ten years and two years of special education (Science/Art/Commerce). There is no section on the subject training in this syllabus. Following is the stanza from Teachers Curriculum framework published by National Council in Teacher Education (NCTE)[1] in 2006-

> *Teacher Education Institutes suffer from isolation at both levels: the school as well as from centres of high learning. Often in schools, the methods of teaching curricula and various other requirements are different from those advocated and implemented in teacher education institutes. As a result school consider teacher education institutes as alien and not a space for 'realistic' professional development for teachers. The teacher education institutes on the other hand, merely fulfill the formality of completing the prescribed number of 'lesson plans' with little concern for preparing teachers for constantly demanding and fluid classroom situations.*

Currently no systematic mechanisms exist for continued teacher academic support and professional development.(NCTE, 2006)

Despite repeated reiteration of the need to professionalize the school teacher in policy documents and commission reports over the last 30 years, most teacher education programmes continue to 'train' teachers to adjust to the need of an education system in which education is seen as the transmission of information and learning reproduced from the textbooks.

Also the course that pre-service teachers undergo involves teaching of 6 classes each of 45 minutes, which is a very insufficient time to understand anything about teaching. The discussions and researches carried out by the community of researchers in India, have remained far from the Teacher education colleges. One evidence for this is the syllabus planned for primary teachers. How should I teach multiplication (or any particularly difficult topic) today in my classroom is the question that teachers face after finishing their Educational courses and which finally forces them to read the textbook description. Constraining the teaching to textbooks many times makes the teaching closed and exam oriented rather than interesting and motivational for thinking. The teachers remain unaware of the world of research in mathematics education till the end of his/her mathematics teaching career. This is because during their educational training they read more about philosophies and methodologies in education than actual subject training or teaching.

In 1981 National Council of Educational Research and Trainings (NCERT) published an important report on teacher education. 145 abstracts of M.Ed (Master of Education) studies and 16 PhD thesis from different states of the India were analyzed. Most of these were from Science Education, Mathematics Education and English education. Some of the studies on teachers' attitude, status, student-teacher relationship were also analyzed under this report. The studies were conducted in different 15 states. The summary of the outcomes pertaining to Mathematics Education is as follows -

- Interactive classes were found superior in mathematics learning.
- The classroom behavior of the teachers with good command and confidence over the subject found effective and satisfactory.

The results are known and supported by many teaching models (Ball, Shulman) but still not reflected in the 2006 curriculum for teacher education.

One more problem which is highlighted by the recent feasibility study - 2005 done on post-graduate programs in Education in India by the elementary education programme- MA(Elementary) (started by well known NGOs and educational research centres like HBCSE, NIAS) talks about the lack of research in teacher education at the elementary level. The other findings of the programme are as follows -

- very few post graduate programmes in elementary education
- the existing programmes are more concerned about 'liberal' aspects of the discipline than 'professional'

Above all is indicating that professional development of teachers is not happening at pre-service level, even though all teacher educators keep telling teachers to be professional. Pre-service teacher education are the courses which makes an individual eligible for the job of teacher. The issue of in-service teachers is more critical. These teachers are frequently trained by the DIET (District Institutes of Education and Training) staff. The DIETs are consisted of the experienced teachers. The 80% of these teachers are from secondary school (NCTE). DIET staff either have no experience of teaching or they are teachers teaching at secondary level. The mathematics as subject understood by secondary teacher is very different than they need to understand at primary level. There is strong mismatch in what happens in the DIET training and what are teachers requirement. This makes it difficult to respond to the requirements of the job, which are to work in schools with primary teachers, evaluating training impact, identifying teachers' needs and designing programs that respond to them.

What, then, can be a way forward for teacher educators to develop more meaningful support for teachers in schools, and so fulfill the promise of decentralization[2]?

- There is a strong need for comprehensive professional training for DIET staff to help them be effective by developing the skills, knowledge and understandings appropriate for primary teacher educators.
- There is a need to reconsider the recruitment rules that demand double Masters degrees for DIET posts, and therefore exclude most primary teachers from becoming formal teacher educators, as primary teachers are rarely university graduates.
- There is a need to promote closer links between the DIET and teachers to help create upwards and downwards information flows between teachers and teacher educators.
- There is strong need of understanding about 'what' are the gains from the existing teacher

education programmes towards the professional development of teachers.

Surprisingly such issues are missing from National document such as National Curriculum Framework-2005 (NCF 2005). NCF 2005 is encouraging constructivism in teaching and learning process. This has emphasized the role of primary teacher as a facilitator with a tremendous pressure of making situations available to students to construct the knowledge. In all this psychology of individual teacher is ignored and they are just many times advised to improve themselves. But ability to realize that something we need as teachers, and that needs to be developed at individual is lacking. Asking teachers, that what you need to become a good teacher, some of the responses I received are "We need more resources" or "We need much more ready made material which will save our time" or "we need some exposure". On the whole the responses are about the things which are not in their hands. The lack of such abilities shows unawareness about the self and the community.

In the end, it would be helpful to remember that professional development research has helped identify attributes and principles of effective professional development practice. Effective professional development practice promotes collegiality and collaboration; it encourages risk-taking and experimentation; it involves teacher educators in decision-making on the basis of their experiences and it help them to reflect on as well as put into practice what they learn; it helps them re-examine their knowledge-base and provide supportive learning environment for professional development of their colleagues. Because effective professional development promotes critical reflection on one's professional experiences, it can help teachers work for the learning society both through example and through persuasion.

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Note:

1. NCTE – It is a National Centre for Teacher Education. All teacher education institutes in India follow guidelines and curriculum given by NCTE in academic as well as in administrative front.

2. Decentralization – It is done for the load sharing of teacher education service on the central government. Every state has a state council called as State Council of Educational Research and Training (SCERT). SCERT looks after the curriculum textbooks and teacher training for that particular state under the guidance of NCERT. NCERT – National Council of Educational Research and Training is situated in Delhi and takes care of overall work of curriculum framework.