Continuous Professional Development of School Science Teachers: Critical Analysis of Research Trends

Priya Khurana, Assistant Professor, Department of Education, Aditi Mahavidyalaya, University of Delhi, Delhi, India
Bhaskar Mohan Kandpal, Assistant Professor, Department of Chemistry, Shivaji College, University of Delhi, Delhi

Abstract
The recent priority for reforms in education has necessitated research on teacher preparation. Among a variety of other factors, making schooling relevant to the lives of students require a classroom milieu in which the students can be actively involved in making sense of the information within a relevant context. Teacher and student learning are inextricably linked (Jeanpierre, Oberhauser, and Freeman, 2005). It calls for teachers to learn to construct an appropriate atmosphere and employ strategies that promote students to deal with the information presented and argue its personal significance. A number of authors argue that professional development requires a dual focus on both knowledge of subject matter content and an understanding of how children learn specific content (Garet, et al, 2001). Development of these abilities demand cautiously planned, unrelenting, long-term professional development opportunities that actively involve teachers in the learning process.

Keywords: professional development, teachers, students, learning, content, context

1. Introduction
In order to conceptualize teacher professional learning, Opfer and Pedder (2011), in their article reviewed the literature on teachers’ professional development practices, and the impact that learning experiences has on their knowledge and classroom practices. The review demonstrated the ways the elements of the three subsystems (the teacher, the school, and the learning activity) interact and combine in different ways and with varying intensities to influence teacher learning. According to Johnson (2006), “more support is required for professional development efforts to be successful, such as resources and time, as well as administrative buy-in and support.”

When looking at teacher professional development, one must examine the content of experiences, the processes by which their professional development will occur, and the contexts in which it will take place (Ganser, 2000). Different facets of present classroom scenario thus need to be duly taken into cognizance before planning learning opportunities for teachers. Following sections focus on trying to explore a few factors which impact teacher learning and practice.

2. Diversity In Classrooms: A Growing Concern
The major educational developments in the recent years—the political recognition of Universalization of Elementary Education (UEE), the Right of Children to Free and Compulsory Education Act 2009, and more recently the Universalization of Secondary Education (USE), all directly or indirectly demand for an urgent reform in teacher education in terms of dealing with diversity of learners existing in today’s mainstream schools in India. Rashtriya Madhyamik Shiksha Abhiyan (RMSA 2005) also recognizes the need for special efforts to bring the out-of-school children, especially girls and children from disadvantaged sections, to school. It further focused on the educational development of children belonging to the Scheduled Castes, Scheduled Tribes, Other Backward Classes and Educationally Backward Minorities.

Starnes (2010) affirms “one must think about that no matter who we are, how we learn, or how much alike we seem to be, we come together with widely diverse perspectives that affect our learning and the meanings we construct”. Saxena (2012) too argues that Diversity is an in-built feature of today’s Indian classroom, but it seldom forms the basis of the classroom planning. Hence, the children, their diverse experiences and backgrounds require an immediate focus and necessitate their amalgamation into current educational research. Starnes (2010) explored her student teachers’ thinking about diversity and its impact on teaching. Amongst other findings, the one found strikingly alarming was “their thinking about diversity was limited to one dimension that is, perhaps racial/cultural diversity or learning challenges, but not both”. However within the process of discussions with her students, they identified three categories of diversity and gave them working titles: who we are, how we learn, and how we understand. The group agreed upon that “there could be as many combinations of these diversities as there are students and we have to teach in ways that support each individual learner and that we must always be thinking about these diversities in our teaching”.
Rajeshwari and Saxena (2011) assert that “the teachers have a crucial role in initiating and anchoring the whole process. To match their expected profile in inclusive set-up it becomes imperative that they are capacitated to i) negotiate attitudinal barrier, ii) comprehend the collaborative setting, iii) exemplify the role of regular teacher in an inclusive setup, iv) encourage and motivate fellow colleagues”. All these concerns have increased the need manifold for well planned professional development opportunities for teachers. Davis et al (2006), claim that expert teachers need to be able to understand their students as learners so that they can help them develop understandings and participate in the learning communities of classrooms. Consequently it imposes a much larger responsibility on the shoulders of teachers and their education- both pre-service and in-service.

3. Integration Of Teachers’ Knowledge In Professional Development Programmes: A Review

In recent years concerns about the value of teacher education have resulted in efforts to make teaching an inimitable enterprise involving special forms of knowledge and skill. Professional development activities should be according to the requirements of the teachers. It becomes crucial that science teachers’ professional development should carefully integrate science content knowledge and science process skills. Jeannipierre, Oberhauser, and Freeman (2005), on analysis of few studies suggested that increasing teachers’ science content knowledge and then having them apply that knowledge through actual experience support substantial teacher learning and positive change in the classroom. According to Garet et al (2001), the data from their study provide empirical support that the collective participation of groups of teachers from the same school, subject, or grade is related both to coherence and active learning opportunities, which in turn are related to improvements in teacher knowledge and skill and changes in classroom practice.

Van Driel, Beijaard, and Verloop (2001), in their article discuss professional development in the context of the current reforms in science education from the perspective of developing teachers’ practical knowledge. The article argues that “reform efforts in the past have often been unsuccessful because they failed to take teachers' existing knowledge, beliefs, and attitudes into account”. The notion that teachers need to have deep knowledge of both the content they are teaching and how students learn that content is not new. Shulman (as cited in Gess-Newsome and Lederman, 1999) was the first to discuss this concept, which he called pedagogical content knowledge (PCK). PCK was later defined as: “that special amalgam of content and pedagogy that is uniquely the providence of teachers, their own special form of professional understanding…. PCK... identifies the distinctive bodies of knowledge for teaching. It is the category most likely to distinguish the understanding of the content specialist from that of the pedagogue”.

Hashweh (2005) called for viewing PCK as neither a subcategory of subject matter (subject matter knowledge for teaching) nor as a general generic form of knowledge but presents a view of PCK as a collection of teacher professional constructions, a form of knowledge that preserves the planning and wisdom of practice that the teacher acquires when repeatedly teaching a certain topic. Vanessa (2009) argues that making PCK more explicit in the teacher education process may help novices adjust to teaching, as well as aiding experienced teachers in developing more reflective practices. Pernilla (2008) draws attention to the value of student-teacher’s participating in experiences that might contribute to the development of their PCK and supports a view of PCK development as a process of transformation. Morine-Dershimer and Kent (as cited in Gess-Newsome and Lederman, 1999) carefully examined pedagogical knowledge and presented their own model of its derivative components. They posit that the most important aspect of generic knowledge that impacts teaching is context-specific pedagogical knowledge.

A study by Lee, and Luft (2008) depicts the PCK of experienced secondary science teachers who are serving as mentors to beginning science teachers. Each teacher ultimately conceptualized PCK as the knowledge for teaching science, and all of the teachers had the following components in their individual models: science, goals, students, curriculum organization, assessment, teaching, and resources. Each teacher, however, had a personalized representation that directed his or her instructional decisions and actions. While these findings are from a small pool of exceptional teachers, they articulate components that experienced teachers may need to benefit from professional development programmes, along with ways in which these components can interact with practice. A preliminary understanding of the components and their interaction can assist those who plan and implement professional development programmes for teachers.

4. Continuous Professional Development Programmes: A Need

It is clear from the above arguments and the discussion henceforth that professional development programmes require a multifaceted viewpoint. It is evident that there is an urgent need to understand the cultural, linguistic, gender, socio-economic and learning disparities of present learners and thus evolve suitable strategies for teaching these children. Therefore teachers are required to be trained in developing such strategies. To raise the achievement of students, the National Curriculum
Framework (NCF) – 2005 also suggests “contextualization of pedagogic processes and creation of ethos which enable all children to succeed irrespective of their social backwardness and gender”. However, Reimers (2003) also posit that besides an individual satisfaction and financial gain that teachers may obtain as a result of participating in professional development opportunities, the process of professional development has a significant positive impact on teachers’ beliefs and practices, students’ learning and on the implementation of educational reforms. The CABE Committee Report (2005) on universalization of secondary education also placed its emphasis on the teachers as the most important component of quality schooling, and thus making it necessary to continuously upgrade the quality of teachers through on-the-job training, inservice education programmes and a variety of other mechanisms, besides preservice qualifying programme of teacher training (B.Ed.).

Gerard (2011) suggested that “professional development programmes that engage teachers in a comprehensive, constructivist-oriented learning process and were sustained beyond 1 year significantly improved students’ inquiry learning experiences in K-12 science classrooms”. Thus drawing our attention to the long term support teachers require in order to deal with the demands posed by the curriculum and its transaction. CABE committee report (2005) also supports this by stating, “besides the conventional in-service education programmes, it will be necessary to develop a mechanism whereby secondary school teachers would be able to share their experiences and learn from each other, indeed develop a learning community and culture”. In order to change instructional practices in meaningful ways teachers not only need to learn new instructional practices and content but also must alter their current practices through a revised process of professional development that includes continued support (Reddy, 2010). Reimers (2003) stated that ‘for years the forms of professional development opportunities available to teachers consisted of seminars, workshops or short term courses that offered new information on a particular aspect of their work.’ But it can be conceded that recently the notion of teacher professional development has begun to be considered as a long term process that includes regular opportunities and experiences planned systematically to promote growth and development in the profession.

5. Concluding Remarks

It is noticeable that with the new notion of professional development as continuous process and the issues highlighted, the need arises to address the issue of teacher professional development in a more comprehensive manner. Creating and maintaining a continuum between the pre-service teacher education and the in-service teacher education opportunities for the practicing teachers needs serious transformation.

Thus choosing the content of the professional development may consequently be the most important decision when developing a professional development program. Content, here can be broadly defined to include subject matter content and ways to teach that content, knowledge about students and how they learn, and pedagogical content knowledge (Jeanpierre, Oberhauser, and Freeman, 2005).

It can be accentuated that the teachers’ extent of sensitivity to existing issues and tribulations as also to learners undoubtedly have an effect on the quality of curriculum transaction in the classrooms and thereby pupil learning and the greater course of societal transformation. It is implicit that for strengthening school science teachers to deal with pedagogical challenges they come across in their classrooms, it would be necessary to carefully create and develop continuous professional development opportunities for them.

References


[18] Rashtriya Madhyamik Shiksha Abhiyan (2005), MHRD: New Delhi


