

Collaborative Action Research: As A Means of Empowering Science Education and Professional Development of Science Teachers

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Abstract

One major issue in Science Education Research is that it is infected with the problem of non-translation of research findings into classroom practices. There are many mechanisms through which this issue can be tackled. One way is through Action Research but a better way is through Collaborative Action Research between a school based Science teacher and a University based research scholar. In this way, Collaborative Action Research serves as a bridge which joins the gap between the theories of Science Education Research and its practical applications. Thus, it empowers Science Education Research making it more useful, practical and relevant for teachers at the ground level. As adopting Collaborative Action Research makes the practitioners to reflect at their own practices and making needed changes in their own practices thus it also promotes the professional development of the teachers.

Keywords: collaborative action research, professional development of teachers, action research, science teachers.

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I. INTRODUCTION

As facilitator of knowledge (educators), we are all interested in making our profession more productive. All our activities, in and around schools/colleges, focus on this objective. So, all attempts to make teaching-learning more interesting and fruitful become pre-requisites. The entire approach of objectively reflecting on our own practice and making needed changes helps us to perform better and better. This type of systematic effort is can technically be achieved through an action research termed more popularly as teacher research. Action Research is a process by which practitioners attempt to study their problems scientifically in order to guide, correct, and evaluate their decisions and actions (Corey, 1962, p. 6) and eventually develop reflective practices to improve students' learning outcomes (Mills, 2003, p. 5). With time the term action research has emerged with new terminologies and reflective teaching practice is a common term that stands close to the notion of action research. Reflective teaching practice is at the core of science education as well. Science is a discipline that the students consider as a problematic area of study and that need innovations on part of the teacher. The teachers' researches in the classroom provide an avenue for them to test their ideas and incorporate the same in their practice.

However, we can also not deny the fact that the teachers are already overloaded with administrative as well as pedagogical works and to find time for carrying out a research like activity is a problem for them. Nevertheless, researchers and science education community have shown interest in reaping the benefits of teacher research through its commonly termed as Collaborative Action Research (CAR). CAR presents an innovative way to bring about change in the practices of science education capitalizing on the potentials

of a full-fledged researcher and that of a science teacher engaged in the field.

II. COLLABORATIVE ACTION RESEARCH: A SYNOPSIS VIEW

CAR can be variedly defined depending upon the collaborating partners. However, in the present paper CAR is conceptualized as a collaborative research wherein the collaboration is between a practicing teacher and a researcher so that both of them benefit from the outcome of such research (Rai, 2009).

The teachers are an internal part of the day to day classroom processes and hence they have their own perspectives and insight into the problems which are affecting the teaching-learning processes. However, the prevalent research culture hardly makes any attempt to use this understanding or insight of the teachers to generate the solution of the problem faced during the classroom interaction and discourses of which the teacher is an inherent part (Moore and Moore, 1995).

CAR is an avenue through which change in the existing classroom status or science teaching practice is achieved through a capitalization of the potentials of both the teachers as well as the researcher. The science teachers are capable of identifying a real problem from their day to day classroom experiences. The researcher in the other hand has the expertise to make the investigation project scientifically sound and assist the collaborative project with his or her knowledge and skill on research methodology. Through such collaboration the teacher is self motivated by the presence of his voice in the knowledge construction process and develops

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a sense of ownership for the knowledge. The science teacher benefits as the knowledge thus created brings about a change in his or her repertoire of knowledge and skill and improves their practice. The researcher benefits in that they are able to solve a real life problem and they contribute to the enrichment of and enhance the body of knowledge related to science education. Thus CAR provides an opportunity to the science teachers to participate in the decision making process to affect change. Provided that there exist a considerable lag in the innovations reported in science teaching and learning in the literature and the translation of the same in actual practice by the teachers, the relevance of CAR in reducing the gap is well acknowledge and beyond doubt. The existing gap between research conclusions cannot be reduced unless and until the teachers representation is ensured in the knowledge construction process and they have an appreciable involvement in decisions regarding pedagogy. CAR is a mechanism and innovation to address the issue and ensures establishing the relevance of the research conclusions and their practical usefulness. Highlighting the significance of CAR, Burns (1999) asserts that "collaborative action research processes strengthen the opportunities for the results of research on practice to be fed back into educational systems in a more substantial and critical way" (p. 13).

III. COLLABORATIVE ACTION RESEARCH IN SCIENCE EDUCATION: A FRAMEWORK

CAR is considered as a professional development mechanism and a way to reduce the gap between the conclusions of science education research and actual classroom practices. It is a collaborative venture. The Framework proposed for CAR has two key players and a context. The two players are the i) Science Teacher and ii) Professional Researcher collaborating and working in a common context that is iii) the context of Science Education (School Level or College Level). Each player in the joint venture has specific role that are mostly collaborative in nature.

i) Science Teacher:

The science teacher is the ground level player in the educational endeavour. They are practically the most informed with respect to the students' problems as well as the specific learning problems that the students encounter with respect to different scientific concepts and relationships. Thus they are potentially most appropriate person to identify practical and relevant problems related to teaching and learning of science.

The science teacher is also potentially informed to help the researcher in designing practical activities for teaching and learning of science. They co-operate with the researcher to design the intervention program for the students.

Finally since they are participant in the knowledge construction process they are the practical users of the knowledge created. The sense of ownership increases the probability of the use of knowledge and hence reduce the research practice gap.

ii) Researcher:

The researcher with a rich theoretical knowledge base is able to refine the teachers' problem a delicate it in the wider context of knowledge base of science education. Thus the teachers felt problem of given a wider meaning and a proper context. Further, the researcher has a more prominent role in designing the method and carrying out related analysis. They serve as the key player in communicating the results, generalizing and enriching the literature pertaining to science education.

The two players illuminated by their theoretical knowledge and practical knowledge respectively thus are engaged in a collaborative mood with the aim to add to the knowledge base of the science education literature and to make science teaching and learning more effective and meaningful.

iii) Context:

There is a specific context needed for carrying out the collaborative venture. The context as outlined over here is the science class involving at the any level of education-primary through secondary to tertiary. The context provides the background for origin of the problem or need of innovation and it is in reference to the context that the teacher and researcher get united for a joint effort to ameliorate science teaching and learning.

IV. RESULTS AND DISCUSSIONS: CAR AND PROFESSIONAL DEVELOPMENT OF SCIENCE TEACHERS

It has been asserted a long back that Sparks (1983) noted: "Staff development offers one of the most promising roads to the improvement of instruction" (Sparks, 1983). It has been established that there is a direct relationship between the students achievement in science and mathematics and the characteristics of PD of their teachers (Kennedy, 1998; Wenglinsky, 2002). The traditional PD programs that are generally organized for a limited period of time from time to time has been established to be of little value to address the issue of improving teachers competencies in teaching science (Guskey & Huberman, 1995; Kyle, 1995). Darling-Hammond & McLaughlin (1995). There is need for innovative means of professional development of teachers (Fullan 1995) far removed from the approach to offer "package of knowledge to be distributed to teachers in bite-sized pieces needs radical rethinking" (Lieberman, 1995, p. 592). Acknowledging the need for innovative strategies for PD for science teachers Shankar (1996) asserted professional development programs need to be "ongoing and embedded in the purposes and practices of schooling involve teachers in defining the purposes and activities that take place in the name of professional development" (p. 223). Innovations in thinking about the professional development of science teachers, is thus, the need of the hour when science education has itself undergone a revamp in terms of its pedagogy.

Further, there is need for a rethinking over the professional development of the science teachers from epistemological perspective. The current science teaching and learning is

embedded in a constructivist perspective arising out of the theoretical inputs from the writings of Dewey, Vygotsky and Bruner. The constructivist perspective emphasizes on the learners' construction of knowledge in which the learner's previous knowledge and understanding plays a crucial role in interpreting and understanding new scientific concepts. Epistemologically the science teachers' professional development strategy is supposed to emanate from the constructivist perspective. The assumption that fragmented packages of knowledge and skills given to the science teachers from time to time will help them develop professionally has been established to be fallacious. The strategy needs to be innovative as well as one that originates in the teachers' practice, matures in the practice and in the process changes their practice. The science teachers cannot be considered as mere recipients of knowledge developed and validated out of their own context and by someone external to the practice context. The teachers' have to be involved in the knowledge construction and meaning making process if we wish them to understand the spirit of constructivism.

CAR offers one such strategy that helps the teachers to develop themselves professionally on a continual basis embedding in the constructivist perspective. The teacher along with the researcher is a co-creator of knowledge and at the same time they are the users of the knowledge thus created. The science teachers engaged in such collaboration are expected to end up not only with a product in form of knowledge, skill or a strategy but they also develop themselves professionally through the use of the product in their professional context. CAR ensures teachers' participation in the decisions regarding the practical knowledge needed and the way to construct and use that knowledge.

V. CONCLUDING REMARKS

A major issue in Science Education Research is that it is infected with the problem of non-translation of research findings into classroom practices. The reason for such a gap is the lack of science teachers' say in knowledge construction process. They are merely considered as consumers of the knowledge for which they are least motivated. CAR serves as a bridge which joins the gap between the theories of Science Education Research and its practical applications. Thus, it has the ability to enhance the practical use and relevance of the outcomes of science education research. Further, CAR offers an innovative strategy to ensure continuous professional development of science teachers by providing opportunities to reflect at their own practices and make needed changes in their own practices in a scientific, critical and collaborative way.

The paper addressed the issue of professional development of science teachers using a new perspective that is supported by sound theoretical underpinnings derived from the constructivism and has a practical relevance in the contemporary scenario in which constructivism is the buzzword for designing professional development programs for science teachers. The symbiotic relationship fostered by CAR is meaningful for both the partners in the collaborative venture and specifically it gives an entry to science teachers' perspective as an insider's view point on significant issues related to science pedagogy.

VI. REFERENCES

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