Ideas of and Attitudes towards Projects and Changing Practices: Voices of Four Teachers

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Abstract: The paper reports a study of the project practices of four Indian middle school teachers, elicited through semi-structured interviews of individual teachers. The teachers also responded to a proposal to modify four aspects of existing project practices, viz. subject integration, assessment, group work, and management of resources. The aspects were derived to be significant from the recommendations of the Indian National Curriculum Framework (2005), and based on research literature on project-based learning (PBL). The study found that teachers largely used projects as motivating exercises before teaching, or an activity for applying what was learnt. Hence, they associated fluid meanings to projects, like tasks given as home assignments, gathering information, or a scrap-book activity. Teachers felt too burdened with work for conducting projects within school hours, and sought systemic changes before the researchers' proposal for changing practices could be implemented.

Introduction

Over the last two decades there have been efforts to change school education policies and practices across the globe (Cochran-Smith, Feiman-Nemser, McIntyre, & Demers, 2008; Lam & Lidstone, 2007; Pinar, 2003; Saha & Dworkin, 2009). These curricular reforms have focused on child-centred and inquiry-based teaching in classrooms (Markic & Eilks, 2012), and have resulted in a renewed interest in teacher professional development (Cochran-Smith et al., 2008; Lam & Lidstone, 2007; Recife Declaration, 2000). Quality of education and mode of teaching-learning are not determined by school constraints and teachers' competencies in isolation. These are shaped in the larger socio-economic and politico-cultural landscape (Prawat, 1992; Price & McConney, 2013). Therefore, any attempt to improve teachers' practices in isolation would divert from the actual cause and may lead to failure (Lam & Lidstone, 2007).

Curriculum suggestions, no matter how relevant and desirable, do not translate into classroom transactions (Roehrig, 2004), but become merely a jargon (Furtak & Alonzo, 2010), unless they are in conformity with teachers' knowledge, beliefs, and attitudes (Levitt, 2001). Teachers adhere to their teaching practices (Smith, 1996), have incomplete understanding of the reform terms (Furtak & Alonzo, 2010), interpret the new curriculum suggestions using their own philosophy, and make any new suggestion congruent with existing practice (Bryan, 2003). Teachers are frustrated by frequent changes in curriculum guidelines, which are usually followed by increased demand for newer evidences of accountability (Fullan, 2007). One possible way to address these challenges of curricular reforms, is to develop an understanding of teachers' beliefs as an integral part of the

initiatives to promote changes in teachers' classroom practices (Kumar, 2013). More importantly, knowledge of the context and teachers' beliefs can be used to validate the changes envisioned.

The most recent revision in the Indian National Curriculum Framework (NCF 2005), published by the National Council of Educational Research and Training (NCERT, 2005) recommended the incorporation of teachers' voices at every level of planning and implementation of the school curriculum. The subsequent formulation of National Curriculum Framework for Teacher Education (NCFTE) published by National Council for Teacher Education (NCTE, 2009) extended the idea of including teachers' voices to redefine the state of teacher education in India.

NCF 2005 and School Projects

NCF 2005 advocated the use of constructivist pedagogies and interdisciplinary approach in school education. It suggested projects, activities, group work, whole class discussion, debate, role play, etc., as important components in classroom teaching-learning. It also suggested integrating formative and summative assessments of student learning as well as self and peer assessments in classroom practices (NCERT, 2005).

NCERT, the primary author of NCF 2005, formulates educational policies, guidelines, syllabi and even develops model textbooks. There have been different efforts, spearheaded by NCERT, towards implementing the recommendations of NCF 2005, through teacher education, textbook writing, publication of co-curricular materials and environmental project books. The Central Board of Secondary Education (CBSE) is a school education board governing all academic and administrative aspects including conducting examinations, of schools affiliated to it. It has published assessment manuals for all school subjects. Well over ten thousand schools, including those affiliated to CBSE, follow the NCERT textbooks. States have the autonomy to generate their textbooks, broadly in alignment with the policies laid down by NCERT. The textbooks, used by CBSE and those developed by several State Boards, incorporate projects in almost all school subjects, though their use in assessment of students is not always specified. Through periodic circulars over the last decade, CBSE has asked that schools affiliated to them evaluate students not only by summative examinations, but include the Continuous and Comprehensive Evaluation (CCE) scheme. The CCE scheme requires teachers to use projects as a part of formative assessment of students in every subject (CBSE, n.d.). Besides, the *specified* formative assessment includes grading students based on teachers' observations of students' attitudes, attention, conduct in classroom, etc.

The policy changes have led to a higher frequency of projects in schools, with accompanying challenges for teachers and schools, which threaten to undermine the positive outcomes of doing meaningful projects. The concern is evident in a comment made by a mathematics teacher and teacher educator in an educational forum:

> *I feel the suggestions for assessment of (under) CCE in the elementary stages up to Std. VIII, seems to be rather vague - each school is not only pursuing their own ways and means of assessing students in this area but their modes of assessments are also different. There is a lot of complaint that this is causing a lot of physical and mental stress on the students and the parents* (mpencert@googlegroups.com, 21 March 2013).

Projects in Indian Schools

Projects have been a part of school science policy for over four decades (NCERT,

2012). The Government of India has been promoting projects among all children of school going age around the country through more than ten schemes. Some schemes have been running for four decades. The project schemes, except a few like Eco-Clubs, are aimed at identifying and nurturing students in doing science and technology projects, with different emphasis on scientific investigations or technological model making. A few groups of educational researchers around the country have developed modules of investigative tasks aligned with project-based learning (PBL) at school and post school levels (CEE, n.d.; Holbrook, Mukherjee, & Varma, 2000; Mahajan & Natarajan, 1999; Pandey, 2001). A northern State in the foothills of the Himalayas has developed and implemented environmental projects for middle and high school students (UEEC, n.d.).

A set of project books on environmental education, developed by NCERT as co-curricular books for Class VI to X in response to NCF 2005, integrates topics from several subjects. Since these projects are not mandatory, and do not count for grades in examinations (NCERT, 2009), they are neither known to all schools, nor implemented. Teacher presentations at the National Teachers' Science Congress (NCSTC, 2010; 2012) that give a glimpse of what teachers around the country perceive as innovations in teaching-learning, include project practices. However, most projects reported were largely conducted with select students. Those conducted with the whole class were as motivation or co-curricular activities. They did not pertain either to projects as a primary pedagogic strategy with specific learning goals, nor even as a context for formative assessment.

A Pedagogic Response to NCF 2005: PBL and Four Aspects

In order to make projects more central to the teaching-learning, as envisaged in NCF 2005, as well as to address some of the challenges that teachers face in conducting projects, a deliberative curriculum approach (Null, 2011), similar to that suggested by Marx and his colleagues (Marx, Blumenfeld, Krajcik, & Soloway, 1997), had been adopted in our study.

Marx and co-workers (1997) reported their effort in developing and enacting project-based science in response to science education reform in USA during 1993 and 1996. They suggested five features of project-based science viz. driving question, investigations, artefacts, collaboration and technological tools. Their work with teachers was based on "dynamic interplay of four elements: collaboration with others, enactment of new practices in classrooms, extended effort to instantiate change, and reflection on change" (p. 350). The collaboration among teachers and researchers included "working together to inform, share, critique, and support each other" (Krajcik, Blumenfeld, Marx, & Soloway, 1994; p. 490).

Our study had adapted the idea of PBL (Thomas, 2000) to integrate pedagogic elements delineated in NCF 2005. PBL is consistent with constructivist pedagogy. It naturally brings multiple subjects and disciplines together in a real world problem context where students work in groups (Krajcik et al., 1994; Marx et al., 1997; Tamim & Grant, 2013), and do provide opportunity of multiple products for formative and summative assessment including peer and self assessment (Barron et al., 1998). While planning and conducting projects teachers have to take care of a great deal of management aspects like planning and managing resources, time, etc. (Scott, 1994).

The study reported here was part of a plan to help teachers conduct projects that resulted in meaningful learning of curricular content by students. The study began with formulating the four main aspects that such projects need to include: subject integration, assessment, group work and management of time and resources. These were derived from (a) the recommendations of NCF 2005 about learning, projects, and assessment, (b) the nature of projects suggested in textbooks, (c) the possibility of integrating these with the content in the textbooks of different subjects, and (d) the advantages for teachers in a school if they worked

collaboratively. The four aspects are briefly explained below.

(a) Subject integration: There are several difficulties in aligning projects with the content in the textbooks (Krajcik, McNeill, & Reiser, 2008). However projects can take advantage of the repetitions of the content in the textbooks of different subjects (NCERT, 2006). This approach of subject integration may enable students to perceive connections between the topics, subjects and their everyday lives, making learning meaningful and relevant (Beane, 1995; Kaskey-Roush, 2008).

(b) Assessment and learning: Assessment is shaped by the power relationships in the classroom, just as all activities are shaped by social relationships (Foucault, 1977). For instance, *loosely defined* continuous informal assessment of students (as suggested in NCF 2005) can become an "instrument of surveillance" (Hargreaves, 1986 as cited in Gipps, 1999, p. 362). It would be useful to conceptualise assessment from a socio-cultural perspective. An interpretive approach, as discussed by Gipps (1999), may help in understanding and planning assessment by accessing the meanings and values that teachers and students assign to assessment in the context of working on projects.

Assessment is perceived as both of and for learning (Black & William, 1998). Peer assessment provides a non-threatening environment for students. The mutual feedback can help teachers gain rich insights of students' learning and needs for support. Self and peer assessments allow students to become more critical towards their work, as students develop a better understanding of their work and become more responsible and able to set their own targets (Black & William, 1998; Lindsay & Clarke, 2001; McLaren & Stables, 2008; Nicol & MacFarlane-Dick, 2006).

(c) Group work and learning: Learning is conceptualised as a social process along the lines suggested by Rogoff (2003). From the socio-cultural perspective, group work provides a cognitive advantage of better development of concepts and problem solving skills. It may prepare students to participate in a community of inquirers along with their teachers, and inculcate democratic values in them (Cohen, 1994; Echeverria & Hannam, 2013).

(d) Management of classroom and resources: Through effective grouping, subject integration, and planned self and peer assessment, teachers can save time and resources. However, schools need to schedule suitable chunks of time for conducting projects (NCERT, 2005). It is also important to arrange for material and academic resources for students, and to reduce cost by adequate planning.

The challenges in conducting PBL have been extensively reported in the literature (Barron et al., 1998; Blumenfeld, Krajcik, Marx, & Soloway, 1994; Krajcik, Blumenfeld, Marx, Bass, Fredricks, & Soloway, 1998; Marx et al., 1997; Scott, 1994). The findings of the current study on teachers' difficulties in conducting projects are discussed in the light of this research. The literature in the Indian context about teachers' views, attitudes and practices of projects and difficulties associated with the conduct of projects, is scarce, and done before NCF 2005 (CEE, 1997).

Role of Teachers' Beliefs in Teaching-Learning

Researchers concur that tacitly held personal beliefs of teachers about teaching and learning influence their teaching practices, teaching of content and interactions with pupils (Kagan, 1992; Pajares, 1992). One of the ways to understand teachers' practices is to explore their beliefs (Pajares, 1992). Beliefs are known to be resistant to change (Kagan, 1992), and are influenced by a variety of factors including the subculture of their subjects (disciplines), their classroom experiences, opportunities for reflection and social background (Fang, 1996; Markic & Eilks, 2012; Pajares, 1992).

However, teachers' beliefs about teaching do not always play a *functional role* in

planning their classroom teaching (Eley, 2006). Teachers' practices in the classroom may not conform to their belief (Fang, 1996), as practices are influenced by multiple external factors in complex ways. For instance, teachers play a significant role in conceptualising how the given policy and curricular demands can be pragmatically transformed for their classrooms and school culture (Guskey, 2002). However, their actualisation of the intended curriculum is determined by their knowledge, belief, desire and authentic experiences in a particular socio-cultural context (Krüger, Won, & Treagust, 2013; Lam & Lidstone, 2007). Teachers' beliefs and practices interact dialectically. Hence in teacher development, change in practice may lead to change in belief, and not necessarily the other way (Guskey, 2002).

It is not always possible for teachers to articulate their thinking in the form of "overt propositions" (Manouchehri & Goodman, 2000; p. 6). Due to the tacit nature of teachers' knowledge and beliefs, they are only accessible in the practice of teaching (Pajares, 1992). Teachers' descriptions of their teaching practices may be ambiguous, while articulation, separated from teachers' actions, may not represent teachers' authentic voices (Briscoe, 1993; Munby,1986).

In a rare post-NCF 2005 study of two Indian teachers, Nargund-Joshi and co-workers reported that though teachers were able to articulate the curriculum goals, their classroom practices were not aligned with these goals (Nargund-Joshi Rogers, & Akerson, 2011). However, teachers' actual classroom practices are not always accessible to researchers. Besides, reports on project practices may not reflect teachers' intentions for engaging in such practices. One way to address this problem may be to simulate practice through a narrative (Chan, 2012). A discourse that begins with a narrative at an individual level has the potential to realise transformative actions in practice (Freire, 2000). The present study conceptualised such a narrative, which began as a process of meaning making about the practices of teachers.

Objectives

The study conceptualised four aspects of projects that were important for conducting projects in Indian schools in alignment with the recent curriculum policy, and which could result in meaningful student learning. These aspects were subject integration, assessment practices, group work for learning, and management of resources. The study then attempted to know the following:
(a) Teachers' practices of projects, and the challenges they faced while trying to follow recent policy changes on conducting projects, and
(b) Teachers' perceptions about and attitudes to addressing the four proposed aspects in designing projects in their own teaching context.
These formed the inputs for planning a collaborative development of PBL modules with practising teachers, following the constructivist paradigm in teacher education.

Research Design

Reliable ideas about teachers' beliefs can be gained from studying beliefs in relation to teachers' teaching practices. Case studies and oral histories, are appropriate methods for such research (Pajares, 1992). Our study, based on a constructivist paradigm, recognised that teachers' interpretation of the curriculum and anticipated outcomes was shaped by their knowledge about teaching-learning, about students, and their own professional experiences (Manouchehri & Goodman, 2000). Thus, the construction of meaning was not isolated in an individual; meanings were shaped by the interactions between the individual and community,

through negotiation in a socio-cultural context (Simon & Schifter, 1991).

The ideas of teachers about their project practices and responses to suggestions of integration of the four aspects were studied through a suitably developed semi-structured interview with open ended questions (Cohen, Manion, & Morrison, 2007). The study aimed to serve exploratory, descriptive as well as explanatory purposes (Yin, 2003).

The Tool: Interview Protocol

Semi-structured interviews ranging from 30 to 55 minutes were conducted with four teachers during 2010. The interview protocol had been developed to capture teachers' practices of school projects and their attitudes towards the practice of projects relating to the four aspects. During the interviews the researcher looked for the occurrence of any of these aspects, though they appeared in different sequence, frequency and depth of elaboration in each teacher's interview. When a teacher did not refer to an aspect at all, the researcher provided cues to elicit her ideas on that aspect.

At the end of the interview, each teacher was informed of a series of workshops being planned, in which teachers in collaboration with researchers would develop projects and conduct them in their respective schools. They were also told that school managements would be approached and their cooperation would be sought. Teachers' responses to this proposal were also recorded in the study.

Participants

Four teachers (all female) AB, AM, CS and DB from three different English medium schools affiliated to two different education boards were approached and willingly participated in this study. The education boards were CBSE, which has affiliated school across the country, and Maharashtra State Secondary and Higher Education Board (Maharashtra State Board), having almost 20,000 affiliated secondary schools only within the State. While projects were mandated by CBSE circulars as part of formative assessment, they were mandatory only for the school leaving year in the State Board affiliated schools. Hence, it was harder to find teachers in the State schools who conducted projects. An average of 67% teachers in urban schools in the country are female (NUPEA, n.d.). The schools of the participants had an even higher proportion of female teachers, which was typical for the respective school settings. These teachers had interacted with the researchers' institution on other projects, and were considered by their colleagues to be devoted to teaching. Details of the participating teachers and their respective schools are given in Table 1.

Name (age, in years)	Educational qualifications	Experience (in years)	School Education Board / Private or Govt. Managed	Class size (level)
AB (61)	MSc (Zoology), BEd	30 (retired)	Maharashtra State Board / Private	70-80 (VII to IX)
AM (25)	MSc (Physics), BEd	2	CBSE / Private, missionary	40 (VIII to X)
DB (45)	MSc (Chemistry), BEd	18	CBSE / Government	40-45 (VIII to X)
CS (50)	BA (Social studies), BEd	20	CBSE / Government	40-45 (VIII to X)

Table 1: Profile of participant teachers.

AB, though recently retired, had been requested by the school administration to

continue teaching in the same school. She had taught general science (integrated physics, chemistry and biology) and mathematics. AM had been teaching science and had also worked in the physics laboratories of two research institutions for three years. Teacher DB was considered a *good* and *experienced* science teacher. CS, a colleague of DB, taught history, geography and Hindi at the middle school level.

Data Collection and Analysis of Interviews

In the interviews teachers were asked to describe through recall (Eley, 2006) their conduct of projects. All the interviews were conducted, audio recorded and later transcribed verbatim by the first author. Extensive notes were also taken during the interview. The transcripts, if needed, were translated to English, and read several times by the first author over a period of time to identify ideas related to the four major aspects outlined earlier. Segments of utterances were chosen as the units of analysis. The utterances for each teacher were further analysed for patterns using the aspects as framework.

The emergent patterns were then shared and discussed with the second author, disagreements were resolved and the classification into aspects was finalised. The findings are reported here under two major headings: a short descriptive sketch of the teachers' practices and the response of the teachers to the four aspects.

Teachers' Project Practices

Teacher AB conducted projects primarily for two different purposes. In Maharashtra State Board it was mandatory for every student to submit a project report in the final school year. To meet this goal, AB suggested a few project topics in class, students chose a topic and AB expected them to work without her help. The second motivation for AB's projects came from the science exhibitions. She guided one project each year among a group of 4 to 5 students selected by her and mentored for taking part in the competitive science exhibitions. These projects were meant to motivate students to solve real world problems in innovative ways. As the teacher's involvement in these kinds of projects was higher, her practices of such projects was probed in detail.

Following her school guidelines, teacher AM periodically conducted and graded her middle school students on six projects each year. Each time she assigned a project to the whole class on the chapter content to be addressed during a specific period, on which students had to work individually and submit. The projects mostly involved collecting information or samples and presenting them neatly, for example, in scrap-book format.

Like AM, teachers DB and CS too had to conduct projects as part of formative assessment guideline, however, they were assigning projects and activities more frequently. For both DB and CS, projects were short activities like collecting information. They both conducted weekly as well as longer term (2-3 months) projects. Teacher DB made a detailed lesson plan with her colleague one or two months ahead of teaching a lesson, which included activities and projects.

Teachers' Views on Projects and Changing Practices

Teachers' views on projects and their responses to the suggested changes in project practices in terms of the four aspects are presented here. Their attitudes towards project practices are discussed with respect to each of the four aspects, subject integration,

assessment and learning, group work and learning and management.

Issues of Subject Integration

Teachers AB, CS and DB felt that it was possible to conduct projects that integrated topics from different subjects. Teacher CS recalled an instance, where, she gave a project topic from the Hindi (language) lesson that she had chosen because the topic was common for Hindi, Geography and History. However, she accepted that most of her projects were on one topic in a subject. Teacher DB had integrated content from physics, chemistry and biology in several of her high school level science projects. She thought that middle school students did not have the experience of conducting the kinds of projects that the researcher suggested and they were not cognitively ready to submit a written project without taking teachers' help. Hence, at lower levels, an approach involving shorter teacher guided activities that presumably did not include writing tasks, was better than longer independent projects with reports. Although AB had not conducted subject integrated projects, she cited several examples of such projects:

> … *you took battle of Plassey, you went to 1857 … in history … geographical feature of that time is represented in geography project … renaissance during 1857 … what discoveries in science took place … English can be included … Language will come … specially the great litterateur who was there at that time*

She also thought that these were better than projects based on a single subject. She raised the concerns that it was difficult to teach all topics in a subject through projects, and impossible for teachers to provide adequate guidance to students for doing these kinds of projects. Teacher DB too cited an example of a project integrating different subjects:

> *We can develop a project on global warming where we can take up science, social science, and some calculation from mathematics … English … Hindi is always there. Language they need... to write or execute the process. So all subjects can be integrated.*

On the other hand, teacher AM felt that subject integration was not possible in projects. All her projects were about collecting information or sample and pasting them on chart or books. She felt that ensuring better learning through practical experiences in science was more important than subject integration. She mentioned that science teachers worked with geography teachers in preparing a working model of a volcano for science exhibitions. However, this model making activity, did not seem to contribute to learning either the science or geography of volcanoes, though the teacher did not refer to this problem.

Issues of Assessment and Learning

The four teachers differed about the practice of assessment, its goals, as well as the learning associated with projects. They assessed only students' final productions in projects. Teachers CS and DB referred to better learning through projects, while AM referred to students gaining practical knowledge in science. In the projects aimed for exhibitions that teacher AB conducted, she focused either on the functioning of the model or on the conclusions of investigations, rather than on students' learning of any topics in their syllabus.

Though they had different learning goals for projects, the assessment criteria by teachers CS and AM were similar. Their criteria included "quantity and correctness of information", as well as "neatness, attractiveness, systematic (presentation)". Students were never aware of these criteria used to evaluate their projects. The emphasis on aesthetic criteria meant that students with similar levels of conceptual understanding may get different project

grades because of aesthetic differences. Teacher DB and AB used criteria like students answering questions related to their own projects, and the teachers' overall evaluation of students' productions. It was interesting to note that all the teachers were aware that parents and elders often did the projects for most students. However, they felt that they could do nothing about these practices.

Teacher AB believed that teachers having long and varied experiences in assessing students, were "expert" at quickly assessing each student's contributions in a project.

Teacher DB and CS felt that the recent CBSE mandates on assessment posed a challenge for teachers like them. They had to strike a balance between the traditional written test and multiple forms and modes of assessment as in projects, activities, observation of students' behaviour and attitudes, etc. They had to assess individual students, even though project reports were sometimes submitted in groups. Besides, they worked hard in correcting student submissions of their home assignment.

Teacher DB did not perceive subject integrated projects as a possible solution to the frequent assessments, and multiple projects on disconnected topics that she was already engaged in. In response to the researcher's proposal of embedding written assignments within projects, teacher DB felt that this would create more assessment work for her and if they are not assessed, parents would be unhappy.

Even those teachers, who had explicit assessment criteria, did not feel it necessary to communicate this to their students. They felt it was sufficient to just assign tasks to students. All the teachers also stated that students could not be assessed while the project was in progress. For teacher AB, this was difficult because students were often involved in off-task activities, while other teachers found that students did very little project work at school.

According to all the four teachers, self and peer assessments by students were neither reliable nor helpful. They felt that students favoured themselves and their friends.

When explicitly asked about the benefit of providing feedback to students during their project work, all except teacher CS supported this. Teacher CS perceived that giving "feedback" would give away the correct answer or expected result of the project. Hence she feared that all students would generate similar products and reports. Besides, this would interfere with one of the perceived goals of assessment, namely, to differentiate students' performance. On the other hand, she happily recalled her earlier experience with her Class VI students, who came up with "wonderful projects" after she had given them "some inputs."

All the teachers except AB planned their projects based on the textbook topics they had to cover, though they did not use projects as a primary pedagogic strategy for student learning. Teacher AB had a more complex view. She felt that students learned minimally from the whole class projects that she assigned to satisfy the examination requirements. She conceded that the students she selected and guided for project exhibitions learned a lot, though she did not care whether it was related to textbook topics. However, as the interview progressed, she realised that her students did learn topics from the textbook. She did not have any evidence of such learning as she did not assess her students.

All the teachers opined that all students would not learn by doing projects. However, they justified their opinions in different ways. Teacher AM stated that not all students were able to work on their own to collect information or bring appropriate samples. Teachers DB and CS, however pointed out that most students went to private coaching classes and hence did not find the time after school hours to complete all the different projects assigned to them. This sometimes led to parents completing their projects, and students losing the learning opportunity in projects. Most students in a class did not even take the effort to collect information. According to teacher DB, these students were "very lazy" and they wanted their teachers to provide all the answers. All the teachers felt that there were a few students in each

class who were sufficiently interested to complete their own projects.

Teacher AB's projects did not call for reading of textbook or other related materials by students. According to her, an "average child" (implying an average performer in academics) would not learn through projects, as they would not understand what was required to be learned in the topic unless s/he read textbooks. Following her arguments about project not requiring students to read, and all students not reading textbooks, she suggested that learning could be supported and assessed among students, who perform above average, by providing worksheets at the end of each project. Her idea was that worksheets would set learning goals for students, and help them work towards these goals. Teacher AB's ideas of a project and her concerns were evident in her statement:

> *Suppose you are taking chemical reactions and their types … if you just show in the laboratory different reactions … displacement reaction … combination reaction … your project-based learning completed? You said … so you learn now. … Children will not read this … Otherwise you have to deal … really with a group of students who are little above (average) … You will finish the project and provide the worksheet … They should answer the worksheet.*

Issues of Group Work and Learning

In response to teachers' problems of projects not benefiting all students, and not finding time to help all students, the researcher proposed that students could work in groups, each including students of different abilities. Though teacher AB agreed that in such groups all students would learn by helping each other, she continued to feel that teachers did not have the time to provide the necessary guidance to keep students focussed on project related tasks. Teacher AM had never thought of conducting group projects, but doubted the possibility of grading individual students when they had worked in groups.

Although teacher CS shared her happy experiences about doing group work with students, she was unhappy about students in a group receiving the same grade despite contributing to a different extent and in different ways. Because of this, some students did not prefer group projects, especially those who sincerely contributed to projects, or those who were competitive.

Teacher DB always conducted her projects in groups. She found that only about a fourth of the students were able to complete the tasks on their own. She felt that group work would be beneficial for students from a "higher" socio-economic background:

> *Here we have variety of children, some are from very high class background, the parents are not only socially but even economically higher... so they are able to do better than other(s). We have to think about others.*

Issues of Management

Teachers found time a major constraint in conducting projects. Other management issues included disinterest of parents and students in doing projects, large class size, and limited access to library. No teacher mentioned the constraints of resources - laboratory material, stationary material etc. For teacher AB, it was important to provide a (physical) space for students to exhibit their products, consistent with her goals of participating in exhibitions.

Teachers DB and CS felt that by including activities as they normally did, they were able to cover the topic in less time than they did with routine chalk and talk. Teacher DB needed two consecutive class periods to present and discuss the activities and projects. Both

the teachers felt that students were often unable to complete their tasks in the school and were too burdened with private tuitions to do projects outside school hours.

However, in response to the new proposal for projects that integrated topics from different subjects, and involved extended work in groups by students, including assessment, both DB and CS felt that such projects could be conducted at best once or twice a year. Teacher CS found it very difficult to assess projects in addition to the every day assignments. Teachers DB and AB pointed out that there was insufficient time during school hours to bring together teachers from different subjects to plan, guide and assess projects including topics across subjects. As in most schools in India, these teachers taught for an average of 36 periods (each of 35 minutes) of a total of 50 school periods per week. This context of work was captured in teacher AB's statement:

> *Teacher has lots of work … preparing question papers and checking answer sheets … Complete the course … control the class … these fifty students are behaving differently … Moreover, each day someone (teacher) is absent … attending (to) that class.*

Teachers DB and CS stated that parents perceived projects as a waste of time, away from studying. They argued that there was an increase in the number of projects as a consequence of the new policy of continuous and comprehensive evaluation (CCE). They felt that parents, who were not yet familiar with the requirements of CCE, were burdened by projects, and considered it an extra effort for the students.

On the other hand, teachers AB and AM observed that parents were happy with students doing projects. Early in the interview, teacher AB had stated that it was difficult to implement projects for the whole class, which was large (50 to 80 students) and varied in student performance and interest. Those students, who were interested in projects, probably preferred doing activities to reading the textbook, and made models and other products outside school hours, with help from parents or friends.

Teachers' Summaries of Their Views

Towards the end of the interviews, teachers were asked their views on conducting projects as suggested by the researcher with adequate assistance from the researcher. Teacher AM, whose projects were merely about collecting information or sample, saw little scope for altering her views during the interview, and stayed negative to the proposed changes. The views of teachers AB, DB and CS evolved as the interview progressed, though each to a different degree on the four aspects. They became more positive towards changing their practices to integrate some of the aspects in conducting projects, though they were negative about, and their views remained unchanged, on including peer and self assessment in projects. They sought modifications of the existing systems in schools and policy, like providing support to teachers, changing the existing assessment policy, and school management of scheduling and intake.

Teachers AB and CS expressed that they needed guidance in developing and conducting projects, largely in terms of academic inputs. Teachers AM and DB did not seek such support, and DB was more confident of conducting projects. Teacher CS expressed a need for guidance and support only in the initial years. Teacher AB, on the other hand, was unsure whether just a series of collaborative workshops with teachers in developing PBL modules would ensure their implementation in classrooms.

Teacher AB stated that, given the present policies on projects and assessment, implementation of researchers' plans would require their continuing support and efforts as teachers did not have the time to invest. According to her, teachers would follow the project method, even without external support, only if there were policy pressures to conduct projects

with assessment at the middle and lower classes. Such pressures did not exist in her school board. When asked how teachers would then find the time for doing projects, teacher AB responded:

> *That (the) department will think how to do what … One 10 marks … unit test (can be) discarded. That unit test … will be on the projects. Then you need not prepare so many question papers … check so many answer sheets … it's project … Then teachers will enjoy.*

Teacher DB seemed to converge on the view that she already had the aspects proposed by the researcher in her plan of projects. However, in order to implement the aspects as the researcher wanted, she suggested *system changes*:

> *Whatever, you are saying is possible only if we change the system … and we have children from same background. In this type of learning … if parents and teachers contribute equally for the development of the child … I alone cannot change the system. You alone cannot change the system. We need some(one) … from outside … from inside … from them (parents) … from everywhere.*

The systemic changes that the teacher needed involved (a) parents and teachers working together, (b) homogeneous classes – students from the same (preferably upper) socio-economic background, (c) adequate library facility, and (d) school scheduling that allowed time for students to use the library and for teachers of different subjects to work together.

Discussion

Teachers AM, DB and CS conducted projects in their respective schools because of the mandate of the new CBSE policy. The mandate states that projects must be part of formative assessment, and the number and frequency of projects is not prescribed. Besides, assessment practices are decided by schools or school systems, and teachers of different subjects have some flexibility, though limited, to interpret these practices. Hence, the number of projects conducted by teachers interviewed differed. While AM conducted a project per unit test and the parents did not complain, teachers DB and CS assigned multiple projects and activities for each test much to the dislike of the parents and even the teachers found it a burden.

Though teacher AM and CS were from different schools and taught different subjects, they both used similar criteria of correctness and aesthetics to assess projects. The assessment of teacher DB was different from that of her colleague, CS. Teachers AB, AM and DB, though teaching science, they viewed project as serving different purposes. The differences may, at least partly, arise from the perceived expectations of the school from the teacher. While, teacher AB's school relied on her to guide students on award winning projects for local and national competitions, the other teachers were expected to improve their students' scholastic performance in school and board examinations. Even so, the stated purpose of projects as articulated by teachers AM and DB were largely similar, but they structured their projects and assessment differently.

The interviews indicated that the term project had become a part of teachers' everyday vocabulary, though their ideas of what constituted a project differed from the policy as well as each other. This phenomenon was also reported by Furtak and Alonzo (2010), who reported that teachers enacting an inquiry-based unit among third graders used *jargon* terms hands-on, discovery, exploratory, etc., without their meanings reflecting in their teaching practices. Based on their past experiences of projects and student learning, teachers interpreted the circulars that only prescribed what was to be done, but not how it was to be done. For instance, since the requirement of projects was difficult to meet within school time, the

teachers gave projects as home assignments, or reduced projects to simple short duration activities. Besides, the teachers had not read the policy document, and they knew only fragments of what it contained, as seen by their responses to the four aspects that were based on the policy. When teachers hold sets of conflicting and complex beliefs, one or the other set of beliefs tends to dominate their actual practices, with apparent inconsistency between stated practices and their own description of those practices (Bryan, 2003).

The teachers involved in a study by Achilles and Hoover (1996) found that students were unable to work in collaborative groups on problem based learning, as they possibly lacked the needed social skills. The teachers in the current study also felt that group work was not practical among their students. Similarly Scott (1994), in her experiences of implementing projects, found that students were initially involved in non-academic conflicts, and that the teacher had to put in the effort to support students in learning to collaborate and collaborating to learn. This was reflected by teacher AB, who recognised that to achieve effective group work, the teacher had to provide guidance, for which she did not have the time. The difficulty with collaboration appeared in a different way in the view of teacher DB that having students belonging to diverse socio-economic strata was detrimental to group work. Assessment issues, as in the case of teacher AM and students' lack of interest, as in the case of CS were also cited against doing group work.

Teachers' views on peer and self-assessment disagreed with the recommendations of NCF 2005. They viewed self and peer assessment, in their classes of over 40 students, to be impractical and unreliable, as students were not "mature" enough to grade "impartially." Research studies of design and technology projects among fewer middle school students from similar contexts showed that groups of students, even with different abilities, learned to work together effectively through engaging in complex projects involving multiple tasks (Khunyakari, Mehrotra, Chunawala, & Natarajan, 2007; Mehrotra, Khunyakari, Natarajan, & Chunawala, 2009). The studies also referred to impartial self and peer assessment of products by students.

All the teachers mentioned different goals of doing projects. They used projects either as a motivator before teaching a topic or lesson (Ladewski, Krajcik, & Harvey, 1994), or as one of the exercises to be done after completing textbook content. Each project had to result in a collection, report or model and the assessments mentioned were related to giving marks or grades to students based either on their submissions, or on oral presentations, or both. Teachers CS and AM had explicit criteria for evaluating students' projects. However, these were neither shared with the students, nor were the criteria in tune with their stated goals. For instance, though teachers, other than AB, stated that projects and activities were done to develop students' conceptual knowledge, their projects largely involved information collection and presentation in written reports, and did not promote students' conceptual understanding. Besides, their assessment too focused only on information correctness and aesthetics. Marx and co-workers (1997), reporting on the implementation issues in project-based science among middle school students, noted that teachers had difficulty in designing assessment to measure students' conceptual understanding, as they limited the productions to public performance and written reports that did not always require such understanding.

Although project provides opportunities for multiple ways of assessing the process (Barron et al., 1998), the teachers felt that it was unimportant and impossible to assess the process of students' engagements in projects. Even when suggested, teachers did not feel that inputs and feedback needed to be provided to students during projects, and thought it would be difficult. In fact, the suggestion of communicating assessment criteria explicitly to their students was also declined by all the four teachers. The common knowledge among educational researchers on assessment was thus not yet a part of the teachers' understanding (Grant, 2011).

In their study of PBL practices in projects conducted by researchers among middle

school students, Barron and co-workers (1998) reported that students at all ability levels showed learning gains on skills and concepts. The teachers in the current study were unsure about the benefits of projects to students of different abilities, and at best perceived it as motivating. For instance, teacher AB cited two examples of how students, who had been low achievers, improved their performance after participating in projects. Yet she argued that low achievers would not learn unless they read. This reading students would not be required to do in projects. Therefore, they would not learn through projects. The other teachers too felt that high performers did better projects.

Based on PBL literature, Krajcik and co-workers (2008) summarised that there was a tension in aligning the standards (in the Indian context, the syllabus) and designing project-based science pedagogy. These tensions include selecting content, coverage of content, and deriving generalised knowledge from the task context in PBL. Resolving this tension, the teachers in our study gave primary importance to textbook content, and believed that all students did not learn the required textbook content by doing projects.

The earlier experiences of teachers AB, DB and CS seemed to have predisposed them to the possibility of subject integration. All of them had identified at least one project context that could draw content from multiple subjects. Although teacher AB cited multiple examples, these did not address syllabus content. This was possibly because, unlike teachers DB and CS, she was unfamiliar with syllabi of other subjects. Teacher DB, who had never conducted similar projects at the middle school, observed that middle school level students would not able to do project independently. She also had less confidence than the others in the possibility of subject integrated projects at middle school level. Her concern was reflected in a study reported by Krajcik and co-workers (1998), who found that middle school students were unable to systematically collect data, or draw inferences based on the data.

Resources are known to pose constraints for conducting projects. Blumenfeld and co-workers (1994) referred to the challenges faced by teachers while conducting projects in terms of time, laboratory and library facilities, and large class size with diverse composition. Teacher AB mentioned large class size as a constraint, while for DB it was lack of library facility. Time was the most critical resource constraint for all the four teachers. However, each teacher needed time for a different purpose. Teacher DB wanted time for teachers of different subjects to plan together, while CS needed time for assessing the work of a large number of students. Teacher AB stated that students needed guidance while conducting projects, and it was difficult for teachers to manage the time for that. Teachers found that the inflexible school schedule could not accommodate conducting projects, nor could their students find the time to work on projects outside school hours. A class session of half an hour was insufficient to conduct projects during school hours. Scott (1994) had also cited these time constraints while describing her own experiences of conducting projects.

The four teachers in the study responded in different ways to the researcher's proposal of collaboratively conducting projects using the four aspects. Teacher CS was the only one who felt that the proposal might work in her school. However, she and her colleague DB felt that projects including the suggested aspects could be conducted only once or twice a year. At the other end of the spectrum, teacher AM saw no need for such efforts, as she was content with her practices. The others had concerns that evolved through the interview and resulted in their suggestions for change in school policies and mandates.

Conclusion

This study used semi-structured interviews of four teachers to understand their practices of and concerns about conducting projects, as well as their responses to the four aspects proposed by the researcher in planning and conducting projects. The narrative

discourse used in the study was aimed at encouraging the teachers to reflect on their pedagogic practices of projects. Such articulations by Indian teachers have not been reported so far. The four aspects were identified on the basis of the recommendations of the National Curriculum Framework (2005) related to pedagogy and assessment. These were subject integration, self and peer assessment, group work, and management of time and other resources.

The participants chosen in the study were from different school settings and teaching backgrounds. Yet, it cannot be claimed that the findings of the study can be generalised to all teachers even from these settings. However, many other teachers in similar school settings may share several of their ideas and views. Significantly, the study indicated that teachers did not feel empowered to bring about changes in classrooms needed to implement the NCF 2005 suggestions. It also highlighted, through teachers' voices, the nature of changes in the school and larger educational system that teachers would have liked in order to conduct projects as suggested. For instance, while teachers agreed that teachers and researchers needed to collaborate to implement the new policy suggestions, they pointed to several systemic constraints to the success of the researchers' proposal.

All the teachers' views reflect the challenges of maintaining a balance between assessment policies and addressing the required syllabus topics within a fixed school schedule (Blumenfeld et al., 1994; Krajcik et al., 1998; Marx et al., 1997; Scott, 1994). Teachers (DB and AB) echoed that they could not change their project practices in isolation from the larger school culture and policy issues that shaped examinations and assessment (Prawat, 1992; Price & McConney, 2013), and that there must be a systemic change, rather than only changing teacher practices (Lam & Lidstone, 2007).

The tensions between addressing policy requirement within the systemic and social constraints, may be resolved by enabling the sharing of the educational goals and expectations among all its stakeholders, especially, school management, teachers, researchers, and policy makers. Towards this, a discourse was initiated between a few teachers and researchers about existing project practices, and on evaluating the constraints and identifying the leverage that can bring about tangible change. The insights gained from the study have guided all the later developments in the longer term collaborations with teachers on project-based learning.

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