Projects in School Learning: Teacher Experiences

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According to recent curricular policies guided by National Curriculum Framework 2005, projects have been incorporated in students' formative assessment. However, little care has been taken to survey the teachers' actual project practices and ideas about projects before making it mandatory for all school subjects. Our study explored four teachers' views about projects and some aspects of their project practices through semi-structured interviews and reported here. It is found that although teachers are primarily dictated by policy guidelines to conduct projects in their respective subjects, teachers' own views on projects and understanding about learning decides the way projects are structured and implemented. Teachers do not use projects to teach textbook content, but to reinforce it. They face several difficulties in implementing projects meaningfully, though some potential opportunities are missed due to their limited view towards projects and learning. The insights from the study formed the input to structure collaborative workshops for teachers to develop Project Based Learning modules for middle and high school students.

Introduction

Research has shown that practices of Project Based Learning (PBL) lead to positive changes in teaching and learning. They have been shown to improve the school climate, students' attitude towards learning, performance and work habits, students' problem-solving abilities, self esteem and motivation (Thomas, 2000; Ross and Lowther, 2003), and their understanding of subject knowledge (Boaler, 1998). PBL is shown to improve critical thinking and collaborative skills (Scott, 1994), design proficiency, controlled experimentation, measuring skill, and the ability of students to generate their own questions to guide their scientific inquiry (Barron et al., 1998).

There is no single accepted definition of PBL in academic literatures. In our study we have adapted Thomas's (2000) five criteria to characterise PBL. According to Thomas (2000), PBL is a model of teaching-learning that organizes learning around projects. In PBL, projects are not trivial tasks; they are complex tasks based on challenging questions or problems which involve students in design, problem-solving, decision making and investigative activities (Krajcik et al., 1994, Barron et al., 1998, Thomas, 2000). Depending on the focus of a teacher or a school system, projects take on different formats in different school environments. Above all, teachers' ideas about and attitudes towards subject content, student leaning as well as projects are likely to influence how projects are conducted, and whether and how students are assessed.

Teachers' views

Teachers' ideas about projects and assessment are based on a complex interaction between their concepts of learning and philosophical understanding of education. Their conduct of projects also depends on their knowledge of content and pedagogy.

In a study of the views of Turkish primary school science teachers about the issues related to practice of PBL, Dogan et al. (2011) report that the teachers attributed several positive aspects to PBL. Teachers of different subjects worked together on projects, and found that the funds and library resources were adequate. They were, however, confused about the adequacy and arrangement of computers and material resources in their schools. When asked about students' practices and preferences, the teachers responded that students communicated, worked in groups, effectively used educational technology and engaged in creative activity. Their individual academic differences caused no problem in PBL. They were unsure about students making efficient use of resources and whether they could learn on their own.

Teachers in India do not seem to use a set of consistent criteria while conducting projects with their students. Their projects rarely address the prescribed syllabus, or assessment of students' learning. The few reports prior to the commencement of National Curriculum Framework (NCF), 2005 (NCERT, 2005) related to Indian teachers' views on projects have focused on the limitations of teachers in implementing environmental projects outside the regular school curriculum (CEE, 1997). But the new curriculum has explicit recommendations for teachers to

carry out projects as part of the curriculum. Such curriculum policies can have an influence on the nature and structure of projects in school.

Policy drive for Projects in Indian education

Following policy suggestions in the NCF 2005 to introduce projects in the school curriculum, there is a renewed interest in projects in Indian schools. Several teacher professional development programmes in different subjects organised around the country in response to this policy, introduced the ideas of (a) constructivism, (b) continuous assessment and (c) school projects. Unfortunately, this has resulted in considerable confusion among teachers, school managements and parents about all three aspects, besides problems of responding within a short time to policy suggestions.

A possible strategy to address change in classroom transactions could have been through increasing teacher empowerment. This may be achieved by working in collaboration with teachers, to develop pedagogies that will suit their classrooms, and by listening and responding to teachers' voices (Shome and Natarajan, 2010). The study reported here is part of an initiative to listen to teachers, and use their experiences in developing project pedagogy in collaboration with them.

Method

The research programme was initiated with individual surveys of four teachers using a semi-structured interview format. Teachers' practices of and ideas about projects were probed. The findings from the four individual surveys are reported here.

Objectives

The objective of the study is to gather four teachers' views and practices and analyse their experiences of conducting projects to see how these are connected.

The four teachers

All the four teachers were female who taught at middle and/or high school levels – namely Class V to X. They taught in English medium schools, but used Hindi also to convey ideas. The teachers' profiles including their educational qualifications, years of teaching experience, the School Boards that defined the curricular materials, and average number of students in their classes are given in Table 1. Three of the teachers - AB, DB and AM – taught science, while CS taught history, geography and Hindi (subject).

Name	Educational Qualifications	Experience (in years)	Board/ Institution	No. of students in each classroom
AB	MSc, BEd	30	Maharashtra State Board	70-80
CS	BA, BEd	20	Government, autonomous, CBSE	40-45
DB	MSc, BEd	18	Government, autonomous, CBSE	40-45
AM	MSc, BEd	2	Private, CBSE	40

Table 1. Teacher profiles

Interview Survey Instrument

An interview protocol was developed to capture several aspects of teachers' existing practices of school projects: motivation for projects, their perceived goals, and planning and implementation of projects. Semi-structured interviews ranging from 30 to 55 minutes were conducted among teachers. Teachers' perceptions of benefits of projects and challenges faced in conducting projects were probed. The interviews were audio recorded, transcribed and checked for punctuation. These were checked against researcher's observation notes. The data was analysed as described below.

Analysis of interviews

The responses of each of the four teachers were categorised under one or more of three broad themes listed below. Each teacher's responses are discussed in the context of the subject content addressed by her projects, her expectations of students' learning and her own understanding of PBL.

1. Influence of policy guidelines on teachers' motivation to do projects,
2. Goals of projects perceived by teachers, and
3. Project planning and implementation - (i) assigning tasks to students, (ii) expected outcomes of project, (iii) nature of guidance, (iv) resource use, and (v) aspects of assessment.

Results And Discussions

Influence of policy guidelines

Policies at the School Board, or local School levels are expected to influence teachers' practices. All the teachers in the study noted that there was a recent increase in the number of projects in all subjects due to new policies. In fact, AM attributed projects directly to her school guidelines, while AB had guided students on extra-curricular projects in 18 out of her 30 years of teaching experience, beginning long before the current policies came into force.

AB, the State Board teacher, conducted projects with students of Class VIII to X, while DB and CS, who were from the same CBSE school, conducted projects at all levels (Classes V to X). AM, though from a CBSE school, reasoned that in Classes IX and X, students did not need to do projects as they already engaged in *practicals* (laboratory work). Besides, students made models with explanatory charts to present in the government mandated science exhibitions around the country, or at school exhibitions.

The frequency of projects depended on school circulars and teachers' own teaching plans. AM conducted one project as part of each of the six unit tests in the academic year. AB's project frequency was annual, and for either an examination or an exhibition. DB and CS did not have any set frequency for their projects. Thus, policy guidelines seemed to motivate teachers to conduct projects, but did not change project structure, or connection to student learning.

Goals of projects

Teachers' pedagogical philosophy influenced their perception of the value and utility of projects. In fact all the teachers in the study believed that projects were not suitable for all students. While three of the teachers felt that academically serious students would perform better in projects, AB felt that some students irrespective of their academic performance are motivated to do projects.

"Why should teachers engage students in projects?" elicited different answers. AB's primary focus was to inculcate research ability among those students who were already interested in doing projects. On the other hand, DB, CS and AM conducted projects after teaching the related topic to improve the understanding of a topic among their students. DB and CS felt that projects on textbook topics generated students' interest, and may even help improve their performance in examination. Colleagues DB and CS equated an activity like writing or drawing to short projects. They also assigned projects during a lesson that would encourage students to obtain additional information on the topics. On the other hand, longer projects of AB and CS were linked to more than one topic or subject. DB observed that students performed better in projects when they had already learned the lesson.

> "...So exciting things are done in the class to create their interest in science... whichever lesson we are taking up that month... we choose the activity... So that they are comfortable. Before doing anything they should know what they had to do, otherwise... if it is not clear in their mind... they won't able to express what they want to. They can do better (in projects), actually... after learning (in class)..." (DB)

CS, the social studies teacher, planned activities and projects for topics, which she thought were difficult for students to remember or understand. She felt that longer projects would be more engaging.

> "I am asking them... because these things (project topics) are for their examinations also... ...so that they may be able to read the textbooks and would be more interested to do this work." (CS)

AB, who focussed on research abilities for suitably inclined students, assigned projects in environmental science that required students to go beyond the textbook content. Her projects to all students, often given towards year

end, were not to teach content. She also guided select students on government sponsored national level project competitions.

Teachers mostly assigned projects after teaching in traditional ways to motivate students to read the textbook and perform better in examinations. Their projects involved application of what was taught and had no novel textbook content to learn. When a teacher went beyond the textbook while assigning projects, it was either to serve a requirement for a board examination or was meant for a few select students to participate in competitions.

Project planning and implementation

The outcomes of a project depend on how the project is conducted. Conduct of projects included aspects like setting learning goals for students (discussed above), the extent of specification and nature of tasks, the outcomes expected from students in terms of productions, supports to students by teachers' scaffolding, use of resources, and the way students' productions or their learning had been assessed.

Assigning project tasks

Teachers assigned either well-defined or open-ended tasks, but more often the former. AM assigned only well-defined tasks, while CS's projects were either. Interestingly DB and AB, both science teachers, posed questions with open-ended possibilities to students for initiating their projects.

> "What is the effect of artificial light on plants growth?" (AB, Class VIII)

> "Make a home-made fire extinguisher to be used in our lab, houses etc. What types of acids and bases are you going to use, and how will you make the extinguisher?" (DB, Class X)

Some teachers preferred to conduct individual projects and others preferred group projects. All the teachers including AB conducted group projects for exhibitions. DB always conducted group projects in her class with groups of three to five students, AM and AB conducted only individual projects in class and CS conducted both individual and group projects. Teachers preferred to assign tasks with well-defined result to individuals especially when they had to give marks to students. This is also seen in their views on project outcomes.

Expected project outcomes

The interviews with teachers revealed that teachers encouraged students to come up with tangible products. Students were supposed to do one or more of the following tasks: collect samples and/or information, solve a problem, make a presentation in class, write a report, and make a working model or making an actual product. In most cases all the teachers asked their students to collect sample or information on specific topics. AM assign only this kind of projects to her students. In several cases the collected information needed to be submitted in the form of a written report.

For exhibition purposes all the science teachers expected their students to make a working model. While DB organised students' presentation for all projects, CS did so rarely. On the other hand, most of the exhibition projects by AB were about problem solving, where students had to do experiments, come up with possible solutions or demonstrate a solution. But her projects for examination were individual, where students had to write a report on a given topic. In several cases DB asked her students to make an actual product, like preparing natural indicators of acid/base (project given to Class VI students). Project outcomes are closely tied to teachers' perception of the role of projects in the curriculum, teachers' confidence in evaluating the outcome, and its exhibition value.

Scaffolding and guidance

Students did not receive much help from AM, DB, and CS on projects assigned as home work. Teachers acknowledged that in most cases parents helped students in making the project report. Teacher AB stated that she did not have time to help her Class IX and X students in their school projects. On the other hand, she claimed to guide externally sponsored projects, where she assigned tasks, guided activities, collected resources, communicated with experts and arranged visits to laboratories when needed. DB extended her help to students in class. Both AM and DB helped students with accessing sources of information and suggesting changes in students' productions. Projects were perceived more as addressing a curricular requirement, at best as a motivation to learn, or for mere exhibition of "talent", rather than as a teaching-learning strategy.

Resource use: Materials, facilities and expert inputs

For three of the teachers – DB, CS and AM – material resources were not a constraint for projects. Often students were expected to bear the cost of materials used for projects. Only AB expressed her concern over this issue. Interestingly, AB's school reimbursed the expenses if the project got selected in a competition.

Teachers had mixed opinions about the role played in projects by resources such as access to library, laboratory and the internet. All the teachers found that students collected information primarily from the internet. AB lamented that her students "do not read books". She also felt that this made the library redundant, while the laboratory was more important in conducting science projects. On the contrary, DB felt the need for a library for collecting information, and did not need a laboratory. For AM, who focused on collecting samples and information, and CS, the social studies teacher, both the laboratory and library had little role to play in projects. Only AB felt that for conducting projects, schools needed help from experts, for example, guidance and access to sophisticated laboratories.

How students are assessed

Teachers expressed different views on what to assess and how. The Maharashtra State Board prescribes certain criteria for project assessment: novelty of topic, quality of content, creativity, quality of display, students' own contribution in the work and performance in oral test. AB stated that she had to use these for assessing student projects.

CS used self-developed rubrics for project assessment with the following criteria: properly drawn and labelled figure, "good" handwriting, and use of colours in suitable combination. Showing students' production on "natural disaster," she elaborated that:

> You can find easily the differences between these two... drawn, and coloured it also. Writing is not good... colouring is not good... he is getting 'A'... Otherwise will get A+. (CS)

The students of both AB and CS received an aggregate score on projects, and did not get to know their strengths or weaknesses.

Like CS, AM had self-generated criteria like being neat, attractive, systematic, quantity and correctness of information, etc. However, AM gave feedback to students upon project submission and even asked for modified resubmission. DB assessed students' understanding by asking them questions while they presented their projects. AB mentioned that assessment of students' completed production was an easy task, but it was impossible to assess the process.

> "Assessment is not much difficult. ...They (teachers) do not need time... If you ask teachers to assess the projects, they will ask four questions, and assessment is done..." (AB)

Except DB, all the three teachers relied on finished products to assess their students. Teachers often focussed more on aesthetics and show (exhibition) than quality of content in the project, even when it is stated as a criterion. They rarely assessed student learning through process.

Summary of Results

Resources, class size, lack of teacher strength, and unmatched public expectations are perceived to constrain teachers to traditional methods of teaching (CEE, 1997). However, all the teachers in this study did not state all these factors as major constraints.

Projects were conducted in both Central and State Board schools at the middle and high school levels as part of the regular teaching and learning largely driven by educational policies at school, State or national levels. However, the frequency and structure of the projects were shaped by teachers' ideas of what are projects, their conception of pedagogic strategies, students' abilities, and the role of projects in learning. Teacher AB considered projects as a vehicle to foster the research ability among the motivated students, while the other three teachers relied on projects to motivate students to read content, develop students' ability to remember or perform in examination. Hence, they all structured their projects to address textbook content.

Three of the four teachers (AM, DB, CS) preferred to conduct projects after teaching the content. That is, their projects supplemented classroom teaching, and did not replace it even partly. AB felt that projects would foster learning of varied content, concepts and skills only among some students, and it was "impossible" to expect it to serve all students. Teachers used the term project for all sorts of activities including "collect and paste" activity for middle school students. Teachers rarely posed problems, and if they did, only for introducing projects.

DB and AB frequently structured group projects, CS reported that her students were disinterested in doing group projects, and AM did individual projects. DB used projects, though rarely, for creating a community of learners in class by organising student presentations and discussions of projects in class.

Teachers' ideas about students' assessment were diverse. DB considered questioning as only assessment tool, while the assessment criteria of the other three were not accessible to students. However, DB and AM provided feedback to students during their project and perceived projects as opportunities to support students and explore their difficulties.

Teachers acknowledged that parents often helped students in their projects. Teachers' help was given in finding information sources or resources, when students did not find them on the internet, which they often did. AB perceived monetary, laboratory and expert help constraints in doing projects. A similar finding is reported in a study by Edelson et al (1999), where they explored the "opportunities and obstacles presented by scientific visualization as a technology to support inquiry-based learning." They developed a series of "scientific visualization environments and inquiry-based curricula" and tested in "laboratory and public school classroom settings". The concerns raised by teachers included managing time in conducting projects in a large class size similar to the concerns raised by another study (Blumenfeld et al., 1994). The study reported five teachers enactment of project based instruction in their science classrooms.

Three teachers (AM, DB, CS) felt that projects having open-ended question were unsuitable for many students, and only "good students" could do projects well, while AB quoted several instances of low performing students doing "wonders" in projects. Design and Technology (D&T) projects conducted in the Indian context have included several aspects of PBL pedagogy: the design problem was set in the real world context, the project was goal driven, and it was structured to allow student autonomy (Khunyakari et al., 2007; Mehrotra et al., 2009; Shome et al., 2011). However, these were not conducted by regular teachers.

The study reported a preliminary analysis of the interview of four teachers on their ideas and practices of projects. This study provides an overall picture of four teachers' practices of projects that reflects their position on projects. The findings helped plan and structure a series of PBL workshop for teachers, which addressed development of projects with increased student engagement and autonomy as well as meaningful assessment and feedback.

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