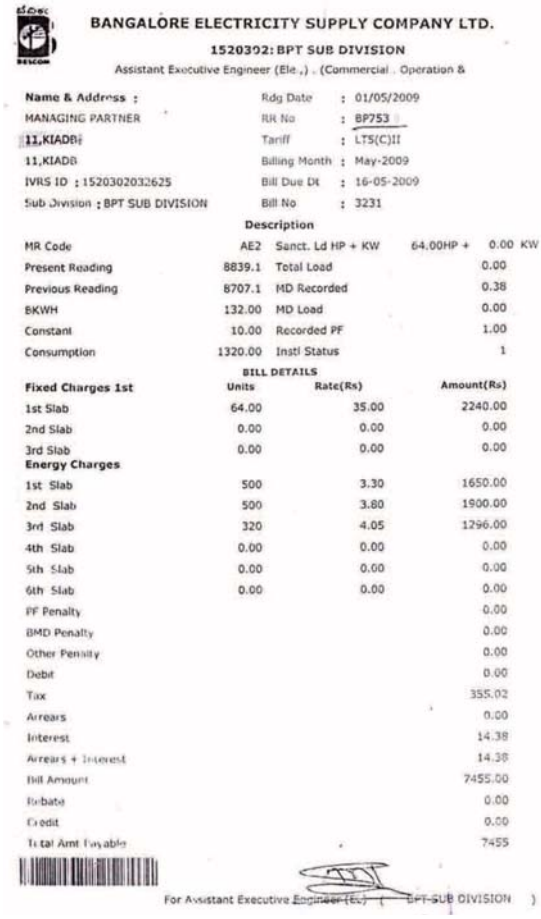
25 Value in Project-based approaches to Learning Science

Priyanka

Students had returned to their classrooms with extra zeal and vigour after the play-time. Some of them were still in a fun mood, a few were trying to relax, whereas a handful of students were waiting eagerly for their teacher. One of them, who was continuously peeping outside, announced that the teacher was heading to the classroom. As soon as the teacher entered, each student was trying to tell her something. But soon they herded in groups in conference style, started chatting, arguing and counter-arguing. The teacher also joined one of the groups and assured the others to join them soon. Is this the scene of usual classrooms in schools or is something going on differently here?

Shortly, it was evident that these students were engaged in a learning task designed around the theme – "Save Electricity". They had planned the task along with the teacher and were working on it since the previous month. Once in a week they used to discuss their project that comprised series of interesting learning activities like-

- Decoding the current electricity bill of their houses with the help of the teacher (power consumption and the amount to be paid)
- Recording meter readings at certain intervals with parental/family support
- Preparation of an inventory of electric appliances in their houses viz. lights, fans, cooler, mixer, press, etc., stating their volt and watt specifications with parental/family support
- Replacing bulbs and tubelights of the house with CFL (required conviction and support from parents)
- Following power saving practices like switching off lights and fans promptly, when not in use; removing plugs from the socket after switching off TV, Computer, mobile charger, etc.
- Maintaining a record of daily consumption time (approximation) for various appliances for 1 month. eg. 3 lighting device of 'x' watt for 'y' hour; 2 fans of 'm' watt for 'n' hour, iron-box of 'a' watt for 'b' hour and so on. (Dependency on family members to inform them of the consumption while they were away from the home)



BANGALORE ELECTRICITY SUPPLY COMPANY LTD.

1520302: BPT SUB DIVISION

Assistant Executive Engineer (Ele.,) . (Commercial . Operation &

Name & Address :		Rdg Date	: 01/05/2009
MANAGING PARTNER		RR No	: BP753
11,KIADB		Tariff	: LTS(C)II
11,KIADB		Billing Month	: May-2009
IVRS ID : 1520302032625		Bill Due Dt	: 16-05-2009
Sub Division : BPT SUB DIVISION		Bill No	: 3231

Description

MR Code	AE2	Sanct. Ld HP + KW	64.00HP + 0.00 KW
Present Reading	8839.1	Total Load	0.00
Previous Reading	8707.1	MD Recorded	0.38
BKWH	132.00	MD Load	0.00
Constant	10.00	Recorded PF	1.00
Consumption	1320.00	Instl Status	1

BILL DETAILS

Fixed Charges 1st	**Units**	**Rate(Rs)**	**Amount(Rs)**
1st Slab	64.00	35.00	2240.00
2nd Slab	0.00	0.00	0.00
3rd Slab	0.00	0.00	0.00
Energy Charges			
1st Slab	500	3.30	1650.00
2nd Slab	500	3.80	1900.00
3rd Slab	320	4.05	1296.00
4th Slab	0.00	0.00	0.00
5th Slab	0.00	0.00	0.00
6th Slab	0.00	0.00	0.00
PF Penalty			0.00
BMD Penalty			0.00
Other Penalty			0.00
Debit			0.00
Tax			355.02
Arrears			0.00
Interest			14.38
Arrears + Interest			14.38
Bill Amount			7455.00
Rebate			0.00
Credit			0.00
Total Amt Payable			7455

For Assistant Executive Engineer (Ele.) (BPT SUB DIVISION)

- Sharing records and observations with peers and teacher at regular intervals
- Computing monthly consumption and estimating electricity charges based on their recording sheet
- Comparison of electricity bill of the next month with the electricity bill of last month, analysis and reflection on parity or disparity and discussion on issues like-
  - Was there any difference or similarity in calculated units and billed units?
  - If yes, what might be the probable reasons?
  - Was the bill amount less or more than the previous one?
  - Did they face any difficulty in following saving practices?
  - What were those difficulties?
  - Would they continue to follow these practices? Why or why not?
- Calculation of average electricity consumption per household per day
- Compilation and presentation of report (group-wise and for the class)
- Exchanging and comparing their findings in terms of per capita consumption and practices with children working on similar project in other schools (also in other countries)

One may ask or argue – What was the need to do all this? The same message might have been given by simply comparing two bills. How did students (12-14 years old) acquire knowledge of terminology, laws and principles and concepts of electricity through such an exercise? Let us ask ourselves a few questions differently

- What would have been the learning objectives behind this task and what learning outcomes should one expect from this exercise? Is the learning process in harmony with the nature of science, the purpose of science education and the aims of education?

Consider a few practices that are/can be followed in the classrooms for this topic

1. Textbook reading followed by writing answers of chapter-end exercises
2. Answering few other questions like – List 5 practices that you can follow to save electricity.
3. Preparing a chart/poster/power-point presentation on "Save electricity" by students and discussion in the classroom
4. Showing a movie/video clip on energy crisis or electricity generation and saving
5. Visit to a hydel/thermal power plant followed by a talk by teacher/expert
6. Weaving required discussion points in the form of a story or using a real case study as discussion trigger and moving ahead with the help of questions ensuring learners engagement
7. A task comprising replacement of few of the high energy-consuming devices with energy saving ones; and comparing electricity bills before and after, followed by a discussion

8. Following energy-saving practices for a month, sharing and discussing in groups frequently, critically analysing and reporting

Considering that this list is not exhaustive and there are many other ways of teaching learning depending upon resources, context, teacher characteristics and other factors; which of these practices

- can provide joyful learning in a real life like situation
- can promote construction of knowledge meaningfully

- would give learners ownership and responsibility for their learning
- would refine their scientific skills like estimating, measuring, data recording, analyzing, interpreting, designing, etc and support them to achieve mastery
- would succeed in nurturing observational, inquiry and thinking abilities of the young learners
- would be able to transform their attitudes, habits and sensitivity towards pressing issues of our daily lives
- would enable them to experience group learning and shape their group behaviour

Let us explore the feasibility of few other learning strategies for students of upper primary or higher grades, learning crop production-

1. Frequent interaction with farms and farmers in the vicinity; observing farming practices for the entire cropping season (different students groups might focus on different crops); comparing difference in practices at various stages; recording their observations at various stages; reporting and sharing with their peers

2. Exchanging farming practices and cropping pattern among students from diverse geography
3. Groups of 4-5 students cultivating different crops like cereal, beans, vegetables or flower (or same crop using different biofertilizers or biopesticides) in small plots, say 4m x 4m; with necessary support from the teacher, school and community both in terms of local knowledge and resources; sharing practices maintaining records and reporting at the end of the season.

Project-based approaches are not new and history of project-based learning can be traced to Dewey (1933). Projects usually involve a specific situation; demand students' initiatives and involvement; necessitate a variety of teaching-learning activities; most often result in a visible end product like report, plan, model, etc and extend for a considerable time period with teacher support.

What Value Do We See in Project-Based Learning?

Project approach focuses student attention on a practical meaning and gets at the heart of the science learning process. It offers students ample opportunity to explore, experience and learn at own pace with ownership. It prompts learners to reflect upon "what you know, what you need to know, and how you are going to know." In Table 1, an attempt has been made to highlight the values embedded in project based approach of science learning.

Table 1

Value of project based learning	Implications for teaching learning processes
Engaging children's minds meaningfully	• Caters to and nurtures innate curiosity of children • Encourages meaningful construction of knowledge • Fosters scientific skills, including reporting and reflection • Connects learning in school to children's real lives • Motivates to examine and analyse everyday experiences
Valuing and addressing children's preconceptions	• Students' preconceptions (formed through observation and interaction with the world) form basis for learning • Helps resolve mis/alternate conceptions during knowledge construction
Nurturing abilities and supporting metacognition	• Facilitates independent learning, critical and logical thinking, problem solving and inquiry • Ownership of learning leads to awareness of what one knows and what one doesn't • Nurtures joy of learning and crops lifelong learners
Learning to learn	• Task based experiential learning • Learners engage with tasks since beginning from deciding learning goals and strategies • Nature of environment facilitating project work leads to acquisition of social learning skills, respect for diverse perspectives, objective outlook, spirit of scientific inquiry and humanism
Learner at the centre of the learning process	Teacher merely facilitates • Access to learning resources • Refining of scientific skills • Conducive learning environment • Validation of work • Presentation of report to authentic audience
Extended and permeable boundaries of the classroom	• Learning extends beyond school boundaries to the community • Learning process and outcomes diffuse to the community • Learning beyond classroom transformation of students into responsible citizens

Assessment for Learning and Development & Project-Based Learning

The trend in contemporary schooling has moved away from term-end summative assessments to continuous and comprehensive assessments. This move has followed the paradigm shift wherein assessment ceased to be viewed as an evaluation of learning to assessment for learning and development. Project-based learning lends itself beautifully to this perspective of assessment. In project-based learning, it is not only the end product that is assessed like most of conventional forms of assessment. Teachers get an opportunity to assess the child for learning, during the process of learning, without any fear and stress. Purpose of assessment goes far beyond assigning scores or grades and helps restrategise and ensure the learning process for development of the child and also to shape their attitude, social behaviour, belief and value system. It offers the teacher, opportunity to map a developmental plan for the child based on evidences gathered. Immediate and formative feedback received by the students from their peers and teachers/mentors forms foundation of self assessment and helps them to learn gaps in their conceptual and procedural knowledge, think critically, reflect upon shortcomings and build upon further process.

Teachers need to employ a variety of learning practices, depending upon curricular objectives, content, infrastructure, learners' need, local context and also their own competence and comfort. No single method can help teachers and learners achieve all curricular objectives. An effective science teaching learning thus needs to be a judicious mix of approaches, project based learning being one of them. The goal of project-based learning is to investigate real life problems that are of interest, relevance, value, and worth to students and teachers, over a sustained period of time. This may be done through series of activities including classroom discussion, gathering information from media, leveraging upon knowledge resource in local community, and carrying out simple investigations predominantly by the students under teachers' mentorship. Value of this approach lies in construction and ownership of knowledge by students, fostering scientific abilities and values and most importantly learning in real life like situation.

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References

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