

Proceedings of One day Teachers' Conference on  
**Project Based Science Learning**

Saturday, 9 th February 2013

Gujarat Bhavan, Vashi

Organised Jointly by  
**Navi Mumbai Science Foundation, Vashi**

In Association with  
**Shree Gujarati Samaj, Vashi**



**Science Utsav 2013**



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**On**

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## Navi Mumbai Science Foundation (NMSF) : A Concept Portal for Innovations in Education

### Philosophy:

'Freedom to innovate' is a basic component to healthy growth of every individual and if guided properly will lead to a technologically advanced yet socially balanced Nation

### Focus:

Enable students in the receptive age group of 10 – 15 years to innovate in a collaborative spirit

### Vision:

Kindle and nurture Student's scientific temperament.  
Support their ability to convert information into knowledge.  
Enhance their Soft Skills including communication skills.  
Enable their Creativity.  
Nurture a sustained growth of scientific and collaborative outlook.  
Build problem solving attitude in child's personality.

### Approach:

Build problem solving attitude in child's psyche.  
Develop a network of proactive research professionals and personalities who would further the 'pupil-centric' approach in education.  
Expose students to a rich variety of subjects, highlight the linkages in various disciplines and emphasize their relevance to real life. \

Mediate periodic interactions between leading educationist and teachers.

### Activities:

**Science Club:** Multiplexes Formal and Informal Education Modes.

**Guidance sessions for "Homi Bhabha Young Scientist Award Examination" :** Focuses on "Pupil-centric" enrichment to Formal Mode.

**National Children's Science Congress (NCSC):** Provides an "Informal Intervention" into Formal Mode of Science Instruction.

**Fun with Science:** Promotes Process Motivation on sustained basis.

**Exhibition of experiments:** A "Learning through Doing" endeavor.

**Teachers' Conference:** A platform for teachers to share and disseminate the best teaching practices.

**(About 3000 students are now being reached through these activities each year)**  
**Hands-on Science in Schools About NMSF**

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# **One Day Teachers' Conference on Project Based Science Learning Program**

- 09.00 – 09.30      Registration
- 09.30 – 09.45      Assembly
- 09.45 – 10.55      - Inauguration & Plenary Session  
Welcome address by Dr A M Bhagwat  
Plenary Talk by Dr Jayashree Ramadas  
Talk by Dr Manekar  
Talk by Dr Tulsi Mukherjee  
Talk by Dr S Kailas  
Vote of Thanks by Mr S P Agarwal
- 10.55 – 11.15      Tea
- 11.15 – 13.30      Presentation by Teachers (8 min each)  
Chairperson: Dr Jayashree Ramadas  
Concluding remarks by chairperson
- 13.30 – 14.15      Lunch
- 14.15 – 15.45      Panel Discussion  
Introduction by Chairperson & moderator: Dr Chitra Natarajan  
Presentation by panel members ( 10 min each)  
Q-A session and teachers' observations  
Concluding Remarks by chairperson
- 15.45 – 16.15      Feedback & Conclusion of the event

## Content

<b>1. Teachers' views about school projects: Relation between students' learning and assessment of learning</b>	<b>5</b>
-Saurav Shome and Chitra Natarajan	
<b>2. Keeping the relevance and focus of projects</b>	<b>7</b>
-Ms. Ratna Biswas	
<b>3. Project based Science Learning</b>	<b>8</b>
-Ms Meenal Deshmukh	
<b>4. Project based learning</b>	<b>10</b>
-Ms. Sweta Pandey	
<b>5. Assessment of student's learning during projects</b>	<b>18</b>
-Mrs. Savita Bhikale and Ms. Sudha Verma	
<b>6. Day to say objects as tool of learning</b>	<b>20</b>
-Ms.Sudha Verma and Mrs. Savita Bhikale	
<b>7. Assessment of student's learning during projects</b>	<b>22</b>
-Mrs. Shobha Ravindr and Mrs. Vijaya Pramod	
<b>8. Assessment of student's learning during project</b>	<b>26</b>
- Purushottam kumar	
<b>9. Key success factors for project work</b>	<b>31</b>
-Ms. Tanzila Sameer S.K.	
<b>10. Project Management Techniques</b>	<b>32</b>
- Ms. Sangita Roy	
<b>11. Critical success factors for school projects</b>	<b>34</b>
-Ms. Abhilasha A. Deshmukh	
<b>12. Project management technique</b>	<b>35</b>
-Ms. Snehlata Patil	
<b>13. Innovative method of learning science- learning by doing</b>	<b>37</b>
-Ms. Lenita Veigas	
<b>14. Project based learning</b>	<b>39</b>
-Ms. M. Lalitha Rajeswari	
<b>15. Key success factors for project work</b>	<b>41</b>
-Ms. Frida Moses	
<b>16. Assessment of students learning during project</b>	<b>43</b>
-Ms. Samreen Shaikh	
<b>17. Project Management : Techniques</b>	<b>44</b>
-Ms. Soni	
<b>18. Day to day objects as tools for science project</b>	<b>46</b>
-Ms. Manasvi Mangesh Shigwan	
<b>19. Project Management Techniques</b>	<b>48</b>
-Ms. Poomima C.	
<b>20. Project Based Learning</b>	<b>49</b>
-Ms. Ritu Sarvahi	
<b>21. Keeping the relevance and focus of the project</b>	<b>51</b>
-Ms. Neena Francies	
<b>22. Keeping the relevance and focus of the project</b>	<b>52</b>
-Ms. Nilofer Shakil Shaikh	
<b>23. The key success factors for project work</b>	<b>54</b>
-Ms. Farida Sohail	
<b>24. Project management techniques</b>	<b>56</b>
-Ms. Bharati Nimbalkar	
<b>25. Project management techniques</b>	<b>58</b>
-Ms. Aarti Vivek Datta	
<b>26. Importance of measurements and analysis in project work</b>	<b>60</b>
-Shri Prakash Agarwal	

## **TEACHERS' VIEWS ABOUT SCHOOL PROJECTS : RELATION BETWEEN STUDENTS' LEARNING AND ASSESSMENT OF LEARNING**

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In response to National Curriculum Framework 2005 (NCERT, 2005) NCERT and several State textbooks included projects, especially in science and environmental studies. The CBSE curriculum (CBSE, 2007) aims to strengthen internal assessment at secondary level and widen the scope of assessment by inclusion of multiple assessment modes such as projects, interviews, questionnaires, etc. The suggested policy change will translate to classroom transactions only when teachers also share the belief that they can do it (NCERT, 2006). One way to help teachers evolve their beliefs is to build collaboration among teachers and researchers on the relevant issues (Shome and Natarajan, 2010).

A series of workshops was organised for teachers and researchers to collaboratively develop Project Based Learning (PBL) module at middle and high school level. Our idea of PBL has been adapted from Thomas' (2000) PBL criteria. PBL is consistent with constructivist teaching affords both formative and summative assessment (Barron, 1998). There is very little documented information on Indian teachers' ideas and practices of projects, their perception of its relationship to teaching-learning. The ideas of 34 participating teachers was collected through a questionnaire containing mostly open ended questions. This paper presents an analysis of the relation between students' learning that teachers associate with projects through teachers' responses to open ended questions and responses to statements on a Likert type scale. Specifically, the paper attempts to find answers to the following questions:

1. Do teachers associate projects with learning?
2. Do teachers associate assessment with projects?
3. Do they relate assessment strategies to students' learning from projects?

### ***Occurrence of learning aspects in spontaneous responses:***

Of a total of 429 responses given as words and sentences by 34 teachers to two open ended questions, a majority of 316 related to some aspects of learning. This included cognitive aspects (145), doing activities (71), collaboration aspects (50) and affective aspects (50). Within cognitive aspects of learning, teachers mentioned innovation and creativity (40) more often than learning (24), understanding (24) or getting knowledge (10). Thus only 71 responses out of 429 free spontaneous responses on projects related to learning of syllabus content.

### ***Occurrence of assessment aspects in spontaneous responses:***

The mention of assessment is even rarer in teachers' spontaneous responses to the two open ended questions. Only a total of 9 responses related in any way to assessment.

**Responses to close ended questions:**

In a 3-scale likert type question with 24 statements, 3 questions pertained directly to learning of syllabus content and one question to assessment. Teachers were very positive that project brought about learning and they felt that it is possible to assess students' understanding of concepts through projects.

Thus, teachers when asked to respond about given statements on project or learning give positive responses to both. However, their spontaneous ideas on project shows that they are largely preoccupied with learning aspects, of which cognitive aspects of learning forms a large category of ideas. They also think that their students learn syllabus content through projects. They rarely, if ever, thought about assessment of students' learning. The study shows that there is a widely held opinion among all teachers that projects lead to learning, which is unsubstantiated by their experiences. They also have never linked assessment as part of projects specifically to get a feedback on students learning. In most cases teachers paid no attention to assess the learning.

In teachers' descriptions of projects conducted by them, it is observed that projects are mostly assessed from the final productions. Teachers gave no evidence of aligning learning goals with specific product or component of product. Even when some assessment is done, it is not used to inform the successive teaching-learning or as feedback to students.

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## **KEEPING THE RELEVANCE AND FOCUS OF PROJECTS**

**Ms. Ratna Biswas**

Lokpuram Public School, Thane

A science project is display of innovative ideas, the interconnecting thoughts and application of basic principles of science in real life through model making and hypothesis. Relevance as title says is relation of something to matter at hand. Thus relevant Science project is relation of the core ideas to the issue or the crisis. For example " Green Building" is an innovative environmental project and its relevance lies in the solution it provides to the issue of global warming and its relevance will only increase in due course of time if the concept shown in the model provides us with crisis which we are facing due to global warming. Maintaining the focus and focus and relevance of undertaken project is very importance as it leads to effective results. Every scientific or research project has an objective and every objective has a certain kind of relevance in context of the topic. The relevance of the project is expected to be with respect to a given goal to be specified by the evaluation of by the project being accepted.

Therefore science project is set up in order to solve a specific problem. One may specifically judge the relevance of the proposed methodology. This contains another aspect which is feasible, but sometimes it is more than this. It may be feasible to perform a proposed project but result will be never be able to solve the problem, because one starwd from a false assumption. Relevance and focus of the project varies from topic to topic and it is very essential that focus which is prime aspect is never lost due to two main reasons.

- 1) Lack of concentration
- 2) Lack of visualization

The team of students should not divert themselves from the aim of the project or experiment. They should visualize the outcome and accordingly concentrate on hypothesis and carry out the methodology of the project. A well portrayed project shows proper connectivity of thoughts and ideas. and an converged approach. The focus of the project can be very well maintained by the proper interaction among team members, discussion of different ideas, removing out one which are irrelevant in context of the topic. Effective monitoring and objective assessment of the group must be ensured by the teachers. Objective should be kept realistic because relevance and focus of a project goes hand in hand and if latter is maintained, the outcome will be substantially effective and relevance. Science project may be of different kinds, like Experimental projects, display projects, theoretical projects but total relevance of any project is a combination of two measures. The relevance of objective and focus of the project with respect to objective and both can be maintained by effective interaction between students and teachers. The well coordinated ideas of both can give the project a realistic shape which can serve in benefit of the society.

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## **PROJECT BASED SCIENCE LEARNING**

**Ms Meenal Deshmukh**  
Green Fingers Global School, Kharghar

A project is that activity which is performed with active participation in a real-life context to achieve a targeted goal. We can also say that a project plan is a modified form of an old method called concentration of studies. The main feature of the 'concentration-of-studies plan' is that some subjects are taken as the core and all other school projects, as they arise, are studied in connection with it in the field of science. Purposiveness, Activity, Utility, Freedom and Social Development are the main objectives of project based learning. By project method, we aim at bringing out desirable behavioral changes among pupils. Children learn better through association, co-operation and activity and an unproductive passive learning of mere facts is substituted with practical "doing and learning".

**Key success factors for project work:** The part of the pupil and the part of the teacher in most of the school work, depends largely on who does the proposing. The teacher must but exercise guidance in selection of the project. It should have evident worth for the individual or the group that undertakes it. The project must have a bearing on a great number of subjects and knowledge acquired through it may be applicable in variety of ways. The period should be timely. The project should be challenging and feasible.

The evaluation of the project has to be done in the light of plans, difficulties in the execution and achieved results. Let the students have self evaluation and look through their own findings. This step is very useful because the pupils can know values of awareness, interest, skills, and attitudes that have been modified by the project.

**Project management techniques:** A project is a whole-hearted purposeful activity proceeding in a social environment, so the students should be motivated. After the selection of the project a plan should be prepared for the completion of the project. The students should be given full freedom to discuss the project among themselves and work should be started accordingly. After the project is completed the teacher and the students together evaluate it. All figures should have graphical representation.

If the students face failure during the project work the teacher should explain the reasons and should suggest to them some better alternative methods or techniques for the success of the project.

### **Methods for measurement : Analysis and numerical output for projects**

Advantages of this is the students can perform calculations and will learn the formulas also. It will help them to know more about the apparatus, chemicals, measurement methods, tools and techniques applied.

### **Assessment of students' learning during projects:**

During project work, pupils are expected to assume some level of personal responsibility for their work and to organize their time for constructive study. The students use the results of their own experimentation and observation to answer a specific question of a specific hypothesis. The objective of project work is to develop the skills of planning design, investigation and interpretation.

***Day-to-day objects as tools for project work:***

It is expected that a science teacher is capable of devising and making tools for some simple experiments, modify apparatus and carryout simple repairs and they should guide the students in making a number of valuable and serviceable models with cheap materials such as Jam jars, bits of wire, corks, motor parts etc. It provides training in manual skills, resourcefulness and ingenuity. These qualities are indispensable for life.

**Conclusion**

The project based science learning provides a practical approach to solving of both theoretical and practical problems. The purpose of this method is to teach psychological laws of learning. It induces self confidence, self discipline, reasoning, decision -making and time-management skills. Project base learning puts challenges to the students and thus stimulates constructive and creative thinking. Apart from this a teacher should try to develop scientific attitude in the pupil for that school should organise science fair, science exhibition, science club work-shops etc.

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## **PROJECT BASED LEARNING**

**Ms. Sweta Pandey**  
Green Fingers School, Kharghar

Project based learning emphasizes learning activities that are long term interdisciplinary and student centered. Unlike traditional teacher led classroom activities students often must organize their own work and manage their own time in a project based class. Project based instruction differs from traditional inquiry by its emphasis on students' collaborative or individual artifact construction to represent what is being learned. Students can spend the entire length of the project involved or come in and out as they see fit.

There are several features that assist to direct the use of project based instruction within a classroom. It is important to provide students with a specific focus.

Project based learning is a dynamic approach to teaching in which students explore real world problems and challenges. With this type of active and engaged learning students are inspired to obtain a deeper knowledge of the subjects they're studying.

It is important that the project has a real world connection. This can be achieved through making several connections to real life experiences or situations that the specific focus age group may be facing. The project needs to allow students to not only make real life connections but also implement decision making skills, interacting with others, learning and applying new concepts and using their knowledge through a variety of education contexts Working together with others. Collaborating with other students is a key element of Project based learning. As well as teachers and the broader community, however, the focus is on independent learning which help promote higher order thinking skills. It allows students to gain information from a variety of perspectives. Implementing research in a variety of environmental contexts is imperative through the application of several technologies including, computer programs, audio visual equipment and real life research to ensure that the full experience of the project is gained. The ultimate goal is to answer a posed question with the collaboration of others.

Project Based Learning is a teaching and learning model (curriculum development and instructional approach) that emphasizes student centered instruction by assigning projects. It allows students to work more autonomously to construct their own learning, and culminates in realistic, student generated products. More specifically, project based learning can be defined as follows :

Focuses on the central concepts of a discipline

Engaging learning experiences that involve students in complex, real world projects through which they develop and apply skills and knowledge.

Learning that requires students to draw from many information sources and disciplines in order to solve problems. Learning in which curricular outcomes can be identified up front, but in which the outcomes of the student's learning process are neither predetermined nor fully predictable.

Experiences through which students learn to manage and allocate resources such as time and materials.

### **Main features**

Although PBL is popular as an approach, it lacks from a universally accepted model or theory and one can find in literature a diversity of defining features (W. J. Thomas, 2000a). In order to capture the uniqueness of PBL and to screen out non examples of it Synteta (2001) made the synthesis of the features described in literature (Reginald & Laferrière, 1999; W. J. Thomas, 2000b), and ended in the following: PBL emphasizes activities that

- ♦ are central to curriculum, long term (more than a couple of class days and up to semester) interdisciplinary,
- ♦ have a driving question that is challenging and constructive are student centered and are based on collaborative or cooperative group learning,
- ♦ are integrated with real world issues and practices,
- ♦ have productive outcomes,
- ♦ have an impact on "life skills" like self management, group process, and problem solving skills, and use cognitive tools, usually technology based.

According to these criteria, there are not PBL instances the projects that are not central to curriculum but serve as a complementary practice, projects that don't have an intellectually challenging driving question, projects that can be carried out with already learned information or skills, projects that are scripted (P. Dillenbourg, 2002), projects that focus on simulated and not realistic questions.

### **Project vs Problem Based Learning**

We have to clarify here, that with the abbreviation of PBL, we refer to Project Based Learning and not to Problem Based Learning. They both have roots in constructivism, as they engage students in authentic student centered tasks to enhance learning, and the line between them is frequently blurred, as they can be used in combination and play complementary roles, but they are not identical approaches.

Project based learning focuses mostly on a production model. Students start by defining the purpose of creating the end product, identify their audience, they research the topic, design the product, do the project management, solve the problems that arise and finish the product followed by a self evaluation and reflection (Crawford, Bellnet website, Autodesk website, Blumenfeld et al. cited in (Schneiderman et al., 1998)). So, the driving force is the end product, but the key to success is the skills acquired during its production.

Problem based learning uses an inquiry model. Students start with a given problem, make a plan for gathering information, pose new questions and summarize their research by presenting their conclusions (Duch, Delisle, Hoffman and Ritchie, Stepien and Gallacher cited in (Schneiderman et al., 1998)).

In this case, the driving force is the problem given and the success is the solution of it (Vu, Van der Vleuten, & Lacombe, 1998). In that sense, Project Based Learning is a broader category than the Problem based one (Moursund, 1999), as the first includes always inquiry and might in cases address a specific problem but not the other way around.

### **Actors**

Roles of actors are also particular in PBL. Project based learning is a structure that transforms teaching from "teachers telling" to "students doing". Students become active problem solvers, decision and meaning makers rather than passive listeners, they collaborate or cooperate forming groups, organize their activities, conduct research, solve problems, synthesize information, organize time and resources and reflect on their learning. Teachers change their role "from sage on the stage to guide on the side" and assume the role of cognitive and meta-cognitive coach (by asking, monitoring, probing, managing, group regulating, keeping moving) rather than knowledge holder and disseminator. Project serves as the initial challenge and motivation (appealing to be explored, seeing up the context of learning)

### **Identity**

In addition, the concept of identity is essential to pbl. This means that the learner has the opportunity to try out various identities while engaged in a project. The learner is also surrounded by other identities, those of the other participants. Identities will vary by expertise which supports the learner's progress. The interaction of identities of varying expertise in part comprises legitimate peripheral participation, as is found in communities of practice (Lave & Wenger, 1991).

### **Assessment**

Generally, with its innovative approach to learning, PBL also requires an innovative approach to assessment, which is challenging. It requires varied and frequent assessment, including teacher assessment, peer assessment, self assessment and reflection. Using technology as a tool and constructivist learning as the methodology, assessment of learning is not a separate process after learning has occurred, but rather learning and assessment are coterminous (H. D. Jonassen, Peck, & Wilson, 1999).

### **Implementation Levels**

Activity based, collaborative, and construction based pedagogies can be implemented at three levels: (1) the micro-level, i.e. smaller pedagogical scenarios or projects which can be components for larger projects, (2) long term projects, i.e. project based classes and (3) the general study environment favoring student initiative and community building on which we will come back later. While micro activities (lasting only over a single or a few lessons) can not reach the same goals as true project based teaching, they nicely can complement traditional instruction and are often the only realistic alternative in today's organization of the school and university system. We now will examine particular instructional design issues, first at the level of smaller scenarios and then for larger project oriented classes.

See also project oriented learning for a wider discussion of different frameworks.

## Efficiency, effectiveness and affordability

Researchers have investigated the impact of project based learning (and related instructional approaches) in a wide variety of educational contexts ranging from early childhood education to medical and legal education. They have generally been shown to be effective in increasing student motivation by engaging them in their own learning, in improving student problem-solving and higher order thinking skills (Stites, 1998). It promotes meta-cognition and self-regulated learning by asking students to generate their own strategies for problem definition, information gathering, data-analysis, and hypothesis--building and testing, comparing these strategies against and sharing them with other students' and mentors' strategies. Teaching with the project-based method enables students to work cooperatively with peers and mentors in a student-centered environment where learners are encouraged to explore various topics of interest. "The collaborative nature of the investigation enhances all of these valuable experiences ... as well as promotes a greater appreciation for social responsibility (Scoj, 1994)". Hence, it also provides opportunities for interdisciplinary learning by engaging students in applying the content of different subject areas during the various phases of the project. PBL helps students develop real world skills like the ability to collaborate well with others, make decisions and take initiative, and face complex problems. After completing a project, if students are asked to create a self--evaluation of the project, like writing a meta--report, this enables the students to focus on their learning process and allows them to see their progress. Self-evaluation gives students a sense of accomplishment and further instills responsibility for learning. And by documenting the learning process it also makes it easy to distribute results to bigger audiences, with all the obvious advantages.

## Difficulties

Although PBL is considered to be a profitable learning strategy, its implementation faces several challenges (Kehoe, Guzdia, & Turns, 1998; Means & Olson, 1995; Synteta, 2001; W. J. Thomas, 2000b; Synteta, 2003) as projects are complex endeavours involving many different activities.

In particular, Students have difficulty to:

- ◆ Initiate inquiry; have coherent research questions,
- ◆ Define a research project; good research design and appropriate methodology,
- ◆ Direct investigations; find resources,
- ◆ Manage complexity and time; keep deadlines, estimate time needed to do a task,
- ◆ Collaborate and give feedback; articulating the work of others and give regular feedback. Known problems concern planning, operationalisation and monitoring (J. van der Veen, B. Collis, & Jones, 2001),
- ◆ Follow up the project; revise products, thing that requires critical thinking skills and cognitive self--awareness (Schneiderman et al., 1998).

In addition to the difficulty of setting clear goals for various phases, students have trouble relating data, concept and theory. A teacher should orchestrate a project into several more or less sequential scenarios who in turn can be broken down to smaller phases. This will insure that learners will focus on smaller sub-- problems, will do things in the right order (e.g define research goals in the beginning of the project and not in the middle).

On the other hand, teachers have difficulty to:

- ◆ Design a PBL course; design projects that support learning of specific concepts and skills and sustain such highly demanding pedagogical approaches like PBL, Follow-up several projects; monitor progress, give feedback and support where and when is needed and generally classroom management,
- ◆ Use technology especially as a cognitive tool; incorporating technology is challenging,
- ◆ Design assessment; assessment that require students to demonstrate their understanding.

### **Interventions and the role of technology**

Many researchers believe that PBL is a beneficial learning model and in order to remediate it's pioalls have run intervention research proposing various strategies to support and improve it. (Krajcik et al., 1998) and (M Guzdial, 1998) use the term "scaffolding" and (Scardamalia et al., 1989)) the term "procedural facilitation" to refer to their intervention strategies. (Barron et al., 1998)), propose to introduce explicit design requirements within the project that prompt students to generate and pursue productive questions. (Blumenfeld, 1991)), propose to help teachers develop "driving questions" that will ensure that student will encounter with complex concepts and principles and develop CSILE, a computer-supported inten6onal learning environment to provide temporary support for young learners who were observed to face difficulties asking questions and directing their inquiries. (Hmelo, 1998)), focuses on providing scaffolds for collaborative group work and (Barron et al., 1998) on providing scaffolds for student self--assessment. (W. J. Thomas, 2000b)) in the conclusions of his dissertation, says that there is evidence that PBL is relatively challenging to plan and enact so teachers will benefit from a supportive context for it's administration. According to (Kehoe et al., 1998)), the combination of supporting learning and doing is critical to successful PBL.

Among the intervention strategies that have been proposed, the use of technology was central : (Blumenfeld, 1991; Means & Olson, 1995). Evaluations of K-12 instruction have shown strong evidence of learning gains associated with PBL plus technology (Cognition and Technology Group at Vanderbilt (CTGV), 1992). (Kehoe et al., 1998) also clearly state that "... technology can play an important role in structuring and supporting effective project--based learning ..." after long experience with "Team Facilitator" (team planning through web), CaMILE (Collaborative and Multimedia Interactive Learning Environment), Reflective Learner (web environment that supports students in writing learning essays using prompts) and STABLE (Small Talk Apprenticeship-Based Learning Environment, a web--based case library of exemplary projects). (Brown & Campione, 1996), say that technology has also the value of making the knowledge construction process explicit, thereby helping learners to become aware of that process. (H. D. Jonassen et al., 1999); state in their manifesto that tools that meaningfully engage the learners should support constructivist environments and that technology--based environments can effectively support these actiuvities. (Krajcik et al., 1994), state that technology makes the environment more authentic to students, because among others the computer provides access to data and information and expands interaction and collaboration with others via networks. A long technical report (USA department of education, 1995) concludes that: " some

aspects of the model (PBL) maybe directly stimulated by technology – notably an increased level of collaboration, heterogeneity of roles, and greater complexity and authenticity in assigned tasks. Other tasks are often reinforced by technology use. But technology-based learning environments can and should support advanced knowledge acquisition. And that can be done by providing environments and thinking tools that engage constructivist conceptions of learning (Kommers, Jonassen, & Mayes, 1992). Thinking tools are technology systems or applications that extend the intellectual functionality of the learner by engaging the learner to tasks that facilitate knowledge construction (e.g. semantic network software, expert systems, databases and microworlds). Even simpler Internet tools add critical and valuable dimensions to a PBL experience. The management issues, for a start, that a teacher can face as the classroom-learning manager of a networked project can be dealt with easier than the ones on an "old fashioned, low-tech" project (in case that teachers cannot meet the students frequently). Another advantage is that the dissemination of the projects is open to bigger and different audiences. More specifically, students have the opportunity to peer, review and browse other similar projects, motivating them and supporting them in the accomplishment of their own project. Most important, the web can be used as a communications and collaboration medium to build ongoing dialogs between the project authors and their audience, especially their teachers. These "author-mentor" dialogs can be planned and organized to motivate students and establish increasingly high standards. A networked project typically involves students in distant locations cooperating to research, exchange information, and learn from one another, although the distant partners may include experts. Students may conduct research, perform experiments in their own community, and report their findings. They may pose questions to experts or exchange information with their peers. (J. van der Veen et al., 2001) focuses also on the important support that telematics (as they call them) can provide to group-based learning.

All the above advantages of a networked project are not without cost. We shouldn't forget the disadvantage of its distant nature compared to face to face communication. To remedy, teachers have to put special attention on details such as meeting deadlines (e.g., using reminders), regular animating the course, and finally, being ready to help and being flexible. Students on the other hand, in order to conclude their projects and enhance their learning, it is important to be able to share project results, to be able to reflect on their work, and stay in touch. In the directions of (W. J. Thomas, 2000b) for future research in PBL, we distinguished two needs, a new theory of learning and instruction that will provide principles for guiding authentic inquiry, knowledge construction and autonomous learning and models for designing efficient and productive projects. In conclusion, for PBL success we have to focus on the following points: careful management and orchestration of instruction, multiple scaffolds during students inquiries, careful and continuous monitoring. Technology can help, as it supports very well features that are important in PBL, like student-autonomy, group. Pedagogical scripts are mostly sequential, at least from the student's perspective. However, it does not mean that these are merely instructions that the learners have to follow. Tasks can and should often be defined as mere goals, e.g. that at some point the teacher can ask students to hunt out and to formulate definitions of the objects they will have to study although the way they do it is less open. In other words, when designing and executing pedagogical scenarios the teacher has to respect a harmonious equilibrium between the freedom left to students that is necessary for intellectual development and motivation on one hand, and certain guiding principles on the other hand.



## **Scenarization of project components**

Structured activity-based teaching involves sequencing scenarios and therefore breaking the « problem » into parts so that the students are challenged to master as many tasks as they are ready to handle. From a more abstract perspective, scenarios evolve in cycles, e.g. a typical teaching/learning phase has more or less the following elements (in whatever order) :

Do  
Deposit  
Look  
Discuss

Resources, tools and products play an important role. Each time a student does something, there should be a product (even as small as a little message) that is deposited somewhere and that can be looked at and discussed. Below is an alternative but very similar loop showing that there are variants of the same principle: Things are looked at, things are produced and discussion happens. It is the principle of information seeking, production and interaction that counts.

Look (discovery)  
Discuss (interaction)  
Do (production)  
Deposit (sharing)  
Feedback (discussion of results)

The teacher's manager role is to make sure that such loops are productive, e.g. that the students produce something, that it is task related, that they engage themselves in meta-reflection (look critically at their own work) and that they discuss and share with others. The teacher's facilitator role is to help students with their tasks, e.g. help them to select resources and tools, explain difficult concepts and procedures, "debug" when they are stuck etc. The teacher's orchestra or role is to implement (or most frequently also to create) the scenarios or scripts as they are also called. This means basically to define a scenario as a sequence of clearly identifiable phases in a way that learners focus on a smaller amount of tasks at the same time and that these tasks are not too difficult to be solved at some point.

Let's have a look at a simple example. Imagine that for a given purpose, students need references for a project. We can turn this into a pedagogical activity with a scenario that includes the following steps:

- ◆ The teacher introduces the theme, gives clues and asks students to consider the different aspects of the subject (Discuss).
- ◆ Students search the web with various search engines and bookmark the links they find interesting (Look, Deposit).
- ◆ Students then try to work out a certain amount of categories and sub-categories for this theme (Look, Do, Deposit).

- ◆ The results are put in common and a hierarchy is worked out (Look, Do, Discuss).
- ◆ The approved categories are entered in a common space (e.g. the classroom wall, a sheet of paper or an electronic links management system) (Deposit).
- ◆ Students classify, enter and describe their links (Do, Deposit).
- ◆ Teacher provides an evaluation (Discuss).

More such scenarios are suggested for example in the TECFA SEED Catalog in terms of scenarios (activities), its constituent elementary activities and supporting technology. As we said before, scenarios should not be "over—scripted", the student should in general be its own master of the tasks and tasks should have some flavor of authenticity. Along similar lines, the teacher should not directly interfere with student's products, but only give feedback an evaluation and let the student fix things himself. Defining a scenario therefore is a workflow design problem, but with the idea that pedagogical workflows are different from the ones in industry. In industry the goal is the product, in education the goal is apprenticeship, i.e. what the student has learnt from performing a set of activities.

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## ASSESSMENT OF STUDENT'S LEARNING DURING PROJECTS

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***"A project is whole- hearted purposeful activity proceeding in a social environment"***  
**- Kilpatric**

Project can be defined as sequence of tasks planned from beginning to end and bounded by time, resources, & required results. Now projects are not limited to business activities but it plays important tool for giving quality education. Project base learning is gaining reputation day by day.

### **Project Based Learning:**

In Project Based Learning, students go through an extended process of inquiry in response to a complex situation. Projects are carefully planned, managed, and assessed to help students learn key academic content, skills such as *collaboration, communication & critical thinking*.

### **Project Based Learning**

- ◆ is intended to teach significant content.
- ◆ requires critical thinking, problem solving, collaboration, and various forms of communication.
- ◆ requires inquiry as part of the process of learning and creating something new.
- ◆ is organized around an open-ended Driving Question.
- ◆ creates a need to know essential content and skills.
- ◆ allows some degree of student voice and choice.
- ◆ includes processes for revision and reflection.

### **Why use Project Based Learning?**

Students gain a deeper understanding of the concepts and standards at the heart of a project. Projects also build vital workplace skills and lifelong habits of learning. Projects can allow students to address community issues, explore careers, interact with adult mentors, use technology, and present their work to audiences beyond the classroom. Project Based Learning can motivate students who might otherwise find school boring or meaningless.

### **How is Project Based Learning used?**

Some teachers use Project Based Learning extensively as their primary curriculum organizer and instructional method. Others use Project Based Learning occasionally during a school year. Projects vary in length, from several days to several weeks or even a semester. Project Based Learning can be effective at all grade levels and subjects, and in career/technical education, afterschool and alternative programs.

## **Assessment of Project:**

Assessment is the systematic and ongoing method of gathering, analyzing and using information from measured outcomes to improve student learning.

Project Assessment is an approach designed to help teachers find out what students are learning in the project and how well they are learning it. Assessment is something that teachers do with students before, during and after learning and not just after learning.

But, assessment is not just about the "assessment-of-learning" Assessment is also an integral component of learning – and learning-orientated assessment processes can not only help us engage students in rich, authentic tasks, but also contribute (in an on-going manner) to the growth and development of all our learners. Effective assessment begins with clear goals. It usually takes some hard thinking before teachers can articulate the specific skills and competencies they hope to teach through the course content. Project Assessment Techniques give faculty feedback on how well they are achieving their teaching goals. Assessment can be formative or summative depend on at what point it is carried out.

### **Formative assessment**

The goal of formative assessment is to monitor student learning to provide ongoing feedback that can be used by instructors to improve their teaching and by students to improve their learning. More specifically, formative assessments: help students identify their strengths and weaknesses and target areas that need work help faculty recognize where students are struggling and address problems immediately

### **Summative assessment**

The goal of summative assessment is to *evaluate student learning* at the end of an instructional unit by comparing it against some standard or benchmark.

### **Summary:**

Even though summative assessment gives the ultimate result of success of a particular project, it is formative assessment that helps most to control the deviations, and improves students learning process. Assessment of student's learning during the project decides not only student progress but also it rearranges the pre-defined path of completion.

### **References:**

Wikipedia

“[http://mediawiki.dp.teoma.com/wiki/Assessment\\_for\\_learning](http://mediawiki.dp.teoma.com/wiki/Assessment_for_learning)”

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## DAY TO DAY OBJECTS AS TOOL OF LEARNING

**Ms.Sudha Verma and Mrs. Savita Bhikale**

Terna Vidyalaya and Jr. college, Nerul

***"A project is a unit of activity in which pupils are made responsible for planning and purposing."***  
**- Parker**

Project method consists chiefly of building a comprehensive unit around an activity which may be carried on in the school or outside. The essence of the methods is to carry out a useful task in a group in which all the students work co-operatively.

The curriculum, content and technique of teaching are considered from child's point of view and demand that the students should think and select their studies for themselves 'Learning by doing' and 'Learning by Living' are the two cardinal principle of this method .Children learn through association ,co-operation and activity.

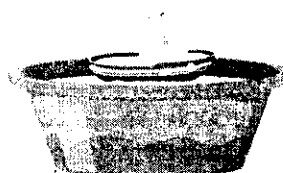
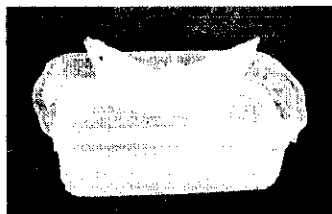
***"A project is a bit of real life that has been imparted into school."*** - Ballard

Yes it's true, and it's totally true for Science, Because Science is the subject in which we can relate to our each and every day activity. When a science teacher teach any topic, for the better understanding she always relate or give example of day to day life and then the concept is clear to the students .It will be more interesting for students when they do that as their project work. Because Learning by doing is a process by which student not only learn new things with interest, but also it will be a long lasting knowledge. That's why in our curriculum the project is been introduced.

But the teacher should give project which should be purposeful; every project chosen should be useful and practicable to the daily life children .The school work should be related to children's life outside the school. There should be some set aims for each project and the pupil should have a clear idea of what they do and why.

The experience gained by the students should be fruitful .Activities undertaken must be completed ,knowledge must be gained and lead to further acquisition of knowledge .The students should learn to co-operate and to share the internal and should develop into a democratic individual.

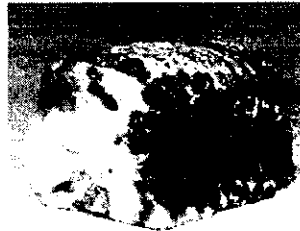
- 1) For example, if the topic is buoyant force one can bring a container which contains water and then by a paper boat or a floating toy student can learn and also explains the buoyant force.



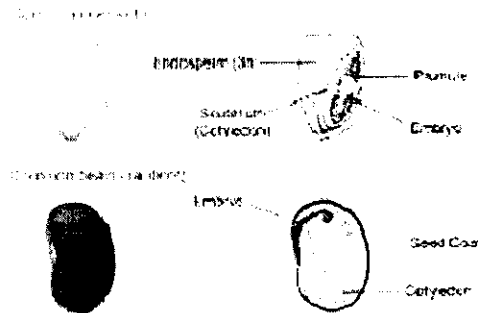
**The upward force exerted by water on the boats is known as upthrust or buoyant force. When a body is partially or fully dipped into a liquid, the liquid exerts forces on the body .**

The force exerted by the liquid is perpendicular to the surface of the body and is equal to the product of pressure and area at that point. The resultant of all these contact forces is called buoyant force.

- 2) Many of the children like bread to eat, so for the topic fungi. One of the student can take a bread piece, soak it in water and keep it in a plate and keep it at the dark for two days. A fine thread like tuft is found growing on the surface of the bread .that will be the fungal growth.



- 3) In our life very important items for the food is fruits, pulses, grains etc. By which student can learn monocotyledonous and dicotyledonous seeds. If teacher gives topic like this to student get all this very easily and do this activity with interest because they know all these very well.



Project related to topic is needed, but also if possible project should relate to their day to day activity or day to day objects of life. More on theoretical base it should be activity base, because student always says,

"I hear, I forget  
I see, I remember,  
I do, I understand"

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## **ASSESSMENT OF STUDENT'S LEARNING DURING PROJECTS**

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Assessment plays a major role in education, possibly more so now than ever before. A key role of assessment is the diagnostic process—by establishing what students have learned, it is possible to plan what students need to learn in the future. Project work is a method of allowing students to use what they have learned in statistics classes in a practical context. It is this practical application of projects that make them such a useful part of the learning process. Although project work may look easy, a brief introduction with this way of working will show how demanding it really is for both teachers and students. Students must make connections between one piece of learning with another. They have to transfer the skills acquired in statistics to other areas such as science and geography, and vice-versa. They have to familiarise themselves with a wide range of information. This is much more demanding than learning one isolated fact after another. Integrated work of this kind is often the best preparation for higher education and future employment. Many forms of assessment, such as assignments and learning activities, are written by teachers for students, i.e., teachers do the thinking and students act on their instructions. Educational psychologists have shown that learning is not like walking in a straight line or climbing a ladder. We do not all learn one thing, then another, then another, in the same order. It is more accurate to compare a student's learning to doing a 3D jig-saw puzzle or making a complicated model rather than climbing a ladder. We put in a couple of pieces, then we may do another section altogether. Sometimes we make a connection we had not seen previously, and occasionally we link two sections together that had not been apparent before.

Project work allows students to connect various pieces of knowledge together that suits a solution to a chosen problem

### **STAGED ASSESSMENT**

Assessment can take many forms; for example, a project can be assessed at completion or may be assessed in stages. Different models of assessment may be used. How these are assessed vary as to how the models are structured and the relevant weightings/grades that are assigned to the various parts of the project. A good motivation factor is to assess the projects in stages since this gives students an indication on their progress and induces them to continue with the work.

The purpose of staged assessment (or assessment in stages) is to provide feedback for students at various points throughout the project. This enables students to attain the maximum benefit and guidance throughout the project period. "Motivated experience results from the exposure of learners to tasks which enables them to satisfy particular needs and hence gives rise to feelings of satisfaction when the objective is attained." (Walklin, 1991).

### ***Three Points to Consider***

**Goals:** A syllabus should be more than the course schedule. You've worked hard to articulate the goals for the course and including them on the syllabus makes it clear to the students what they should be able to do when they have completed the course.

**Expectations:** While syllabi generally include something about your expectations of students (e.g., assignments, due dates, exams), it is helpful to be specific about other things you expect of students (e.g., your expectations for class participation, attendance, class preparation, their responsibility for

learning) and why you have those expectations. It is also important to be clear about what students can expect of you (e.g., the time frame in which you will return assignments, how you will handle late work, that you will start and end class on time). Tone: A syllabus helps to set the tone for the course. Consider your syllabus from the perspective of a student who is considering taking your class. Do you seem approachable? Welcoming? Organized? Excited about the course? Concept Tests are conceptual multiple-choice questions used during class that provide immediate assessment of student understanding. Problem sets can be a useful way to give students practice in solving problems, doing quantitative work outside class time, and practice specific techniques. Problem sets are standard in many science courses and can be an effective assessment strategy in entry-level as well as upper-level courses. Labs can provide another way to assess student learning. The type of assessment might be a lab report, completion of the lab handout, a research project write-up, or some other assignment.

Concept maps can also be used for assessment. Exams and quizzes are commonly used to assess student learning. They also force students to process information and help prevent students from disengaging in a course. Students need to process information in one way or another to learn. In studying for exams, students read, memorize, organize information, test themselves with questions, and with varying degrees of success, process the material for that particular section of the course. Processing information in a blitz of studying before each exam is not the ideal way to learn material, nor in many courses is it the only way students learn material. Studying before exams is, however, one of the most common ways in which students learn in a course. Exams can include multiple choice questions, short answers, essay questions, questions about graphs or diagrams, and so forth. If you choose to use exams, it's a good idea to ask yourself how much of the exam requires students to use higher order thinking skills and how much of it requires lower order thinking skills and whether you are satisfied by your answer in light of the goals of your course. Cooperative exams, also called "two-stage" or "pyramid exams", are exams that are taken by groups of students working together after they have completed the original exam individually. When done in one class period, students take the exam individually for the first part of the class. Then, when all students have turned in the exam, they retake the exam working in groups and, in some cases, in an open-book, open-notes format. Commonly these exams are multiple-choice exams with or without some short answer questions; the cooperative part may also have one or two longer questions. The instructors we know who use this type of exam base the total exam score for each student on 70-75% of the individual exam and 25-30% of the group exam.

Written and oral assignments such as papers, oral presentations, debates, simulations, and so forth can also be used to assess student learning. In some courses, frequent written and oral assignments can replace traditional exams. In some exam-free courses students prepare one or two short written assignments each week in which they summarize the critical aspects of a reading assignment, relate data or readings, make comparisons with what they have learned previously, take positions on issues, and analyse or synthesize information and ideas. These assignments then serve as the basis for group or class discussion and oral presentations or require students to pull together information from a series of classes either to solve a problem or to present a summary analysis of a particular topic. The activities that students are engaged in to learn the material are also used to evaluate their accomplishments.

- Too much assessment may lead to superficial approaches to learning (**surface learning**)
- Consider your assessment tasks as part of the overall assessment workload for the student (students are doing several modules, not just your own module)



- Use both **formative and summative assessment**, combined in continuous assessment to assess student learning. Formative assessment involves giving feedback during the module so that students can continuously develop and improve. Summative assessment sums up achievement and counts towards the final grade
- Too much assessment may not allow you to provide constructive and timely feedback to students on the assessment task. A number of practical ideas are discussed in **Formative Assessment: Practical Ideas for Improving the Efficiency and Effectiveness of Feedback to Students**

Reviewing assessments can help you as a lecturer to plan your future teaching.

For example you can review which questions do most students choose or avoid, what assessments do students learn a lot from completing, what concepts do students still find difficult etc. This review is about both reviewing your assessment strategies and learning outcomes.

Educator Bill Cerbin argues that if the goal of higher education is to improve students' future performance, then the common practice of assessing what students have learned is not enough. What is also required is "assessment that reveals how students learn."

Learning can and often does take place without the benefit of teaching and sometime even in spite of it but there is no such thing as effective teaching in the absence of learning.

Teaching without learning is just talking. Classroom Assessment is an approach designed to help teachers find out) what students are learning in the classroom and how well they) are learning it.

- ◆ **Learner Centered** – Its focus is on observing and improving learning, rather than on observing and improving teaching.
- ◆ **Teacher Directed** – The individual teacher decides what to assess, how to assess, and how to respond to the information gained through the assessment.
- ◆ **Mutually Beneficial** – Students reinforce course content and strengthen their self assessment skills; faculty sharpen their teaching focus by asking 3 questions: "What are the essential skills and knowledge I am trying to teach?", "How can I find out whether students are learning them?", and "How can I help students learn better?"
- ◆ **Formative** – Its purpose is to improve the quality of student learning, not to provide evidence for evaluating or grading students; it provides information on what, how much, and how well students are learning.
- ◆ **Context Specific** – The assessment technique is chosen to fit the subject matter and the needs) of the particular class.
- ◆ **Ongoing** – It is an on going process, i.e. the creation and maintenance of a classroom "feedback loop"; as this approach becomes integrated into everyday classroom activities, the communications loop between faculty (teaching) and students (learning) becomes more efficient and effective; it provides early feedback before students are evaluated for grades so that necessary adjustments can be made. Effective assessment begins with clear goals. It usually takes some hard thinking before teachers can articulate the specific skills and

competencies they hope to teach through the course content what is most important to teach and what students should really learn.

**Classroom Assessment Techniques** give faculty feedback on how well they are achieving their teaching goals. This model is by no means the only way of advising students doing project work. But it will give the students and teachers a framework on which to build and hence minimise the probability of a project failing. If students start with a clear problem scenario and with precise goals to achieve, and produce a detailed outline of work to be carried out, a successful project should result. If we carefully guide our students as they develop projects, with clearly defined aims and objectives, project work allows for the integration of several previously encountered techniques. It may also be designed as a learning process in which students are faced with new concepts and unfamiliar activities. A point made by Kelly (1978) which is worth remembering is that assessment is a method of teaching, not an alternative to teaching. Since education is our chief concern, one of our main goals must be the autonomy of the learner. Project work is a means by which this autonomy can be developed. The use of project work to create a situation in which students' learning is increasingly self-directed and self-propelled is highly recommended.

### **A sample project given to student group**

#### **AIR AND VEHICULAR POLLUTION IN INDIA**

(A Study of Problems, Solutions, Monitoring and Evaluation)

Assessment was based on the work done by Students in the following sub topics-

1. Health Effects Associated With Air Pollutants
2. Vehicular Pollution Problem in Urban Areas
3. Steps Taken For Vehicular Emission Control
4. Alternate Transport Fuel
5. Inspection /Maintenance & Certification System for In-Use Vehicles
6. Initiatives Taken for Vehicular Pollution Control
7. Monitoring of Ambient Air Quality
8. Air Quality Status in Major Cities

(The study highlights the need for the citizens of our country to be more participative and concerned in keeping the ambient air quality level within the prescribed standards. It also highlights the need for the Government and the agencies to bring more stringent norms to transform our cities a place worth living.)

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## ASSESSMENT OF STUDENT'S LEARNING DURING PROJECT

**Purushottam kumar**

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### 1. Introduction

It was middle of the semester and one of my colleague came to me one day and asked I'm not sure that my students are clear with the concepts? So I advised him to go for daily assessment to figure out the correct data and he picked three assessment individual, group and formative and to his surprise he found that with careful project design, management, and assessment the students working as an individual and as a team at specific time can accomplish many positive learning outcomes, they set goals, identify roles and tasks, provide constructive feedback, assess their own understanding, and learn deeply.

It's not something teachers are taught in preserves program. We became aware of the dearth of project-management training for teachers when we began investigating and learning. Time and project management turned out to be the missing link for the competition, and lack of professional development, and a dearth of support, led teachers to stop working on projects in general, so offering assistance to teachers is required to empower them to develop and execute the right structure of an assessment to catalyze students learning processes.

In its training, the foundation must emphasize different stages of successful project-learning design to makes a projects easier to manage, define, plan, do, and review.

Technology can also help train students to take more ownership of their learning. We must use the electronic media which can enable students and teachers to manage everything from project deadlines to assessments to communications, and it features both a public site where students can publish their work and a password-protected site for internal use.

Our education structure demonstrates student's learning goals so that there is an appropriate effort to reach its higher education mission, which displays an appropriate academic content, rigor, and coherence and the curricula are designed so that the students must demonstrate college-level proficiency in general education, essential skills, including oral and written communication and must inculcate scientific skills.

In order to reach more effectively to the students of Schools, colleges and universities have long defined and assessed student learning using course-embedded assessments of student learning, such as tests, papers, projects, as well as Standardized or "custom" qualitative and quantitative measures. All of these are valid and valuable assessment tools if used properly.

We teachers can concluded that the process of defining and assessing student learning would assist faculty in their teaching, students in selecting institutions and in managing their own learning and institutions in planning and supporting students.

**Diverse –To have specific wavelength**

Every student is a unique creation of the God blessed with specific potential and rest they inculcate through the learning processes by the atmosphere we create.

## **2. Purpose**

1. This article serves as a resource for institutions seeking a bridge between the assessments standards for accreditation and the practical daily challenges of assessment and continuous improvement.

2. This article is intended to clarify principles and methods for setting goals for student learning within the context of institutional mission, for using methods chosen by the institution for evaluating the achievement of these goals, and for using the information gathered to continue to improve student learning.

## **3. How it helps?**

It is in the interests of currently enrolled and prospective college students, faculty members, parents, high school teachers and guidance counselors, legislators, employers, and the general public to be informed consumers of higher education.

One must function to provide the pupil with an explanation of the broad scope of higher education and to assure the public that the goals of higher education have been achieved by evaluating each institution within the context of its mission.

One of the means by which the public can understand higher education is through information about the assessment of student learning.

## **4. Assessments Standards**

There should be a great emphasis on the assessment of student learning. By complying with the standards to meet the clear objective of an academic leadership and application based learning.

### **5.1 Guiding Principle 1: Existing Culture**

Begin by acknowledging the existence of assessment throughout the institution in order to ensure that the assessment plan is grounded in the institutional culture.

### **5.2 Guiding Principle 2: Realistic Plan with Appropriate Investment of Resources**

Plans for assessment at the program, school, and institutional levels should be realistic and supported by the appropriate investment of institutional resources.

### **5.3 Guiding Principle 3: Involvement of Faculty and Students**

Academic leadership is necessary in order to gain the support and involvement of faculty members, Staff, administrators, and students across the institution.

### **5.4 Guiding Principle 4: Well defined Goals**

Assessment activities should be focused by clear statements of expected student learning (knowledge, skills, and competencies).

## **5.5 Guiding Principle 5: Appropriate Methods**

Assessment should involve the systematic and an appropriate method to generate interest to motivate an individual and beyond to engage a campus community collectively in a systematic way and continuing process to create and enhance the core of a more clear integrated assessment processes. Parents want the best value, or perhaps the “cultural capital,” that an institution affords. Parents and students are interested in which institution will provide them with the education that will result in a job, or acceptance to graduate or professional school. Employers are interested in the “product” that a college or university produces.

Faculty members, too, have a vested interest in students being informed about their choice of a college or university to attend. It is much easier, and more enjoyable, for faculty members to teach students who are appropriately prepared for their courses, either through earlier preparation or through foundation courses at the institution.

## **6. Assessment – Dust of gold**

Faculty members traditionally have had the primary responsibility for facilitating student learning. They determine what students should learn, both across the curriculum and within individual courses or programs, and how students should demonstrate their learning? Faculty members devise methods of gathering evidence of student learning and collaborate with other faculty members in evaluating student learning in their majors and academic programs. They use this information to create a true scope of learners with their career development.

## **7. Role of an assessment Leader**

An assessment leader should involve all constituencies in understanding how assessment can be helpful, in identifying the learning goals that are most important to the community, in assessing outcomes of an Institutional Context

## **8. Statement's student- A catalyst in growth process**

A learning goals benefit faculty and staff because they identify what to teach, including discipline-specific knowledge and skills, as well as the discipline's perspective and values

1. Provide structure for co-curricular programs
2. Determine what will be evaluated at the conclusion of the course or program

Ensure that skills that should be taught throughout the curriculum actually are included in instruction and evaluation of specific courses We must be in a position to understand or answer

1. What is the expectation for assessing student learning and an institutional effectiveness.
2. Is there a need of a commission or a governing system to assess to understand student learning and institutional effectiveness?
3. How this information should be organized and formatted for the review of the governing body, students and parents?
4. How will the documents of institutional assessment and student learning assessment related?
5. How these results would be used to improve teaching and learning?

## 9. Ways to carve the creative corner

1. Assessment Standards in Characteristics of Excellence in Higher Education
2. Enhancing the Campus Climate for Assessment: Questions for Academic Leaders
3. Key to "Assessment Practices Quiz"
4. Department/Program Student Outcomes Survey
5. Regularly updating the learning goals and Assessment Techniques
6. A Brainstorming Exercise from effect to cause.

examine existing disciplinary accreditation guidelines and standards, and to analyze direct evidence of student learning .

## 10. Questions for the Faculty- a true navigator

In general, what are the most important things a student gains from your field of study?

- ii) What qualities and capabilities do you strive to foster in your students?
- iii) What is the most important knowledge that your students acquire from your field of study or from working with you?
- iv) How does your field of study or your work change the way students view themselves?
- v) In what ways does your field of study or what you do contribute to a student's well being?
- vi) How does your field or what you do change the way a student looks at the world?
- vii) What does your field of study or what you do contribute to the well being of society at large?
- viii) How do people in this area of study differ from those in other areas? (knowledge, skills, and values)?
- ix) How do we know the extent to which students are learning what we hope from our field of study?
- x) How do we use information about student learning and development to enhance student's learning?

## 11. Questions for the students

- ii) What are the most important points or valuable skills or abilities that have you developed as a result of taking these courses, mentoring, or majoring in this subject?
- ii) What is its practical utility?
- iii) How this valuable information should be passed to the next generation to empower the nation?

I know you may be thinking why this unfair ratio of questions to be asked to us and to the students well we all know we have a broader spectrum of responsibilities isn't it?

## 12. Resonance

Well there are several ways by which the wavelength of our efforts towards the development of students and their effective output will be in the same phase to create resonance.

And as a teacher would like to quote following points to increase the effectiveness of an assignment.

### **13. Conclusion**

I feel pride to conclude by saying that such contest or common platform must be provided to bring some phenomenal change in the era of academics which is the utmost need of the globalization. Which has following special features to

1. Develop ability to apply principles and generalizations
2. Develop analytic skills
3. Develop problem-solving skills
4. Develop ability to draw reasonable inferences from observations
5. Develop ability to synthesize and integrate information and ideas.
6. Develop ability to think holistically to see the whole as well as the parts
7. Develop ability to think creatively
8. Develop ability to distinguish between fact and opinion
9. Develop appropriate study skills, strategies, and habits
10. Develop ability to work productively with others
11. Develop management skills
12. Develop leadership skills
13. Develop a commitment to an accurate work

### **14. THANKS NOTES**

I pay my deep gratitude to all the dedicated and creative committee members specially Mr. A.M Bhagwat sir for organizing such a meaningful and a benchmark contest to foster a positive change in field of learning.

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## KEY SUCCESS FACTORS FOR PROJECT WORK

**Ms. Tanzila Sameer S.K.**  
St Xavier's High School, Airoli

Project is where certain activity is undertaken to achieve a definite aim. It is a sequence of task planned from beginning to end, bounded by time, resources and required results.

For a project to be successful, it is essential to understand the project requirement right from the start and go for project planning which provides the right direction to project managers and their teams and execute the project accordingly. A successful project is one that is delivered on time and managed within the budget.

**1) Good understanding and identification of project needs :** The needs of project must be identified and should be understood in order to know the points which can hinder the successful of project. Such points will require having solutions to that they can be completed without any interruptions and delay. This will also ensure the area to be explored for development and improvement skills.

**2) Adequate specification of project requirements :** The project requirement should be specified so that it avoids confusion while implementation. The requirement needs to be clear and should eventually follow the aim which it needs to achieve. This is also linking the idea with reality.

**3) Setting realistic project goal :** The aim set for the project needs to be realistic and not achievable. Planning realistically resources while considering the replanning of these to ensure the match with changing requirements. All resources and efforts involved in the project are linked and managed with primary aim of ensuring that the goals of the project are continuously monitored.

**4) Appreciation of dynamics and change :** As the project advances there are always changes that keep happening. These changes should be taken in to consideration at proper intervals so that the plans of the project can be amended accordingly to accommodate such changes effectively.

**5) Good monitoring and control:** During the project measurement and assessment of the progress against the plan. So that the measurement works accordingly to the project timeliness and the given specifications. The progress of the plan needs to be documented for appropriate monitoring. Adhere to a disciplined program of both regularly scheduled and adhoc internal and external project status / technical status meetings. Project planning, monitoring and communication processes are strictly followed.

**6) Solution sustainability :** Ensure that the chosen solution is going to be effective in the long term by aligning the issues and needs of the stakeholders with the features and functions of the applications, products and processes implemented.

Above success factors can be achieved through following steps :

**1) Conceptualization :** The initial project stage = At this stage a project is determined as being necessary. Preliminary goals and alternative are specified, as well as the possible means to accomplish the goal.

**2) Planning :** This stage involves the establishment of a more formalized set of plans to accomplish the initially developed goals. Among planning activities are scheduling, budgeting and the allocation of other specific tasks and resources.



**3) Execution:** The third state involves the actual 'work' of the project. Materials and project resources are procured, the project is produced and performance capabilities are verified.

**4) Termination:** Once the project is completed, there are several final activities that must be performed. These activities usually include the release of resource and transfer of the projects to the clients and if necessary, reassignment of project team personnel.

Thus during the early conceptualisation and planning stages, effort requirements are minimal, increasing rapidly during the late planning and project execution, before diminishing again in the project's termination.

**THUS A PROJECT CAN BE SUCCESSFULLY CARRIED OUT WITHOUT ANY HASSLE AND AMMOTHLY.**

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## PROJECT MANAGEMENT TECHNIQUES

**Ms. Sangita Roy**

St Xavier's High School, Airoli

Every project is unique in terms of the problems that arise, the priorities and resources assigned it, the environment in which it operates. The use of project management methodologies and techniques will be able to help organisations to face with challenges.

The project management process typically includes four key phases: initiating project, planning the project, executing the project and closing the project.

The project management techniques related to the project initiation phase include : i) Establishing the project initiation team, ii) Establishing the project initiation plan, iii) Establishing management procedures and iv) Establishing project management and work book.

The project management techniques related to the project planning phase include : i) Describing project scope, alternative and feasibility, ii) Divide the project into tasks and establishing resources and creating a resource plan, iv) Developing a preliminary schedule, v) Developing a communication plan, vi) seeing baseline project plan.

The project management techniques related to the project close down phase include : i) closing down the project and ii) conducting post project reviews.

Projects can be various shapes and sizes, from the small and straightforward to extremely large and highly complex.

The techniques listed above in the four key phases of the project management enable a project team to :

- Link project goals and objectives to stakeholder needs.
- Build high performance project teams.
- Work across functional boundaries.
- Estimate project costs and schedules.
- Establish a dependable project control and monitoring system.

Project management is challenging task with many complex responsibilities. There is often a training of education need, It is important for project manager to understand the technology and environment related to the projects, so that together with the team, they are able to have effective solution and technological innovations.

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## CRITICAL SUCCESS FACTORS FOR SCHOOL PROJECTS

**Ms. Abhilasha A. Deshmukh**  
St Xavier's High School, Airoli

Typically, when starting a class project, it is important to pay attention to some factors that will contribute to your project success.

### 1. Set project goals

Make sure there is agreement of team on the purpose and goals of the project.

- ♦ What will be the project outline?
- ♦ What is the desired end results?
- ♦ What need will the project fill?

Goals should be specific and measurable. Clear measurable goals will help define the project scope.

### 2. Develop clearly defined plans with assigned responsibilities and accountabilities.

Developing a plan is more than just entering the tasks. All the deliverable need to be defined along with the necessary tasks to produce them and any associated risks. Responsibilities should be assigned to the tasks and deliverable with appropriate due dates and accountabilities. The planning process should also include risk management activities and communication requirements. Developing the project schedule is only a part of the planning process.

### 3. Manage the project scope effectively

The project scope is defined in the goal setting and planning stages of a project. It would be nice if the scope never changed. The responsible person must always be on the alert for changes to the scope and effectively manage those changes. What affect will the changes have on the budget and the schedule?. How are the changes tracked?. Managing the scope is one of the more challenging parts of managing projects.

### 4. Cultivate constant effective communications

Determine the communication channels needed to inform team on the progress of the project. The project team will need task assignments and regular briefings. The frequency and types of communication for each channel should be defined and managed. Incorporate this plan into the project fall because of poor communication.

If you can practice these critical factors, you will increase the chances of succeeding to manage a project.

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## PROJECT MANAGEMENT TECHNIQUE

**Ms. Snehlata Patil**  
St Xavier's High School, Airoli

### 1. Introduction

Project management is the discipline of resources to achieve specific goals. A project is temporary endeavour with a defined beginning and end (usually time constrained, and often constrained by funding or deliverables)

- a) Undertaken to meet unique goals and objectives.
- b) Typically to bring about beneficial change or added value.
- c) The temporary nature of projects stands in contrast with business as usual ( or operations).
- d) Which are repetitive, permanent, or semi-permanents functional activities to produce products or services. in practice, the management of these two systems is often quite different and as such requires the development of distinct technical skills and management strategies.
- e) The primary challenge of project management is to achieve all of the project goals.
- f) and objectives while honoring the preconceived constraints.
- g) The primary constraints are scope, time, quality and budget.
- h) The secondary and more ambitious challenge is to optimize the allocation of necessary inputs and integrate them to meet predefined objectives.

Problems arise in any organization .Such problems as what products/ systems to develop, should capacity be expanded or should a computer be purchased are just a few an endless number of continuing problems about which management must concern itself if the firm is to survive. These problems and their alternative solutions establish some elements of change around which the organizations must adapt. Projects are generally established to carry out these changes and someone is always responsible for each project's successful completion.

Every project is unique in terms of the problems that arise, the priorities and resources assigned it., the environment in which it operate, and the project manager's attitude and style used to guide and control project activities. Therefore, the organizational structure for the project must be designed to fit within that project's operating constraints. The organizational structure implemented may not be the same structure used throughout the life cycle of the project due to changes in priorities, available resources, project personal, laws and other contingencies. Regardless of the project management structure chosen, management must realize that a dynamic state of equilibrium between limited personal and financial resources and the objectives of the project will be necessary if project management is to be successful in their particular organization. before touching on the major tools and techniques of project management , let's us get to the bottom of what project management truly is.

## 2. Projects :

Nearly every activity within an organization could be labeled as a project possessing unique characteristic and varying levels of importance to the organisation. A project is defined as a planned undertaking of related activities to reach an objective that has a beginning and an end. All projects solve some type of problems, but project may also be established simply to determine and define feasible alternative solutions to problems. Seven primary characteristic of a project include:

- i) **Objective** : Each has a specific goal to reach
- ii) **Schedule** : Point in time in which they must be accomplished.
- iii) **Complexity** : Does technology exist to achieve the projects objectives?
- iv) **Size and number of task** : Step by step plan of action.
- v) **Resources** : Labour, personal, equipment, materials etc. .
- vi) **Organizational structure** : The ' meshing ' of project requirements in to the existing organizations.
- vii) **Information and control systems** : These must be structured to handle problems through the typical lines of authority.

## 3. The project management techniques related to the project initiation phase include :

- a) Establishing the project initiation team
- b) Establishing a relationship with the customer
- c) Establishing the project initiation plan
- d) Establishing management procedures

## 4. Planning the project :

Describing project scope, alternative and feasibility, the understanding of the content and complexity of the projects.

## 5. Closing down the project: The project management

In this stage, it is important to notify all interesting parties of the completion of the project. Also, all project documentation and records should be final review of the project can be conducted. Conducting post project reviews : this is done to determine the strengths and weakness of project deliverables, the process used to create them and the project management process.

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## **INNOVATIVE METHOD OF LEARNING SCIENCE - LEARNING BY DOING**

**Ms. Lenita Veigas**  
**Sacred Heart High School**

Science is all about learning by doing. In this competitive era, Science as subject can be introduced in a very innovative way that is learning by doing. Science knowledge is cumulative. To learn new things you must build on what you already know and try to experiment on it and arrive to the conclusion. In this way you will achieve what you have to learn by doing it with the environment. Investigating and experimenting are great way for children to learn science and increase their understanding of scientific ideas. Hands-on science can also help children think critically and gain confidence in their own ability to solve problems.

The best method of learning and assessing students competence is by project based learning. Project based learning is an instrumental method that provides students with complex tasks based on challenging questions or problems that involve the students' problem solving, decision making, investigative skills, and reflection that includes teacher facilitation, but not direction. Students form their own investigating of a guiding question, allowing students to develops valuable research skills as students engage in design, problem solving, decision making and investigating activities. Through problem based learning, students learn from these experiences and apply them to the world outside their classroom.

the core idea of project based learning is that real- world problems capture students' interest and provoke serious thinking as the students acquire and apply new knowledge in a problem solving context. The teacher plays the role of facilitator, working with students to frame worthwhile questions, structring meaningful tasks, coaching both knowlede development and social skills and carefully assessing what students have learned from tje experience.

Projects are the primary vehicle for instruction in project-based learning. Project can guide the entire curriculum or simply comprise of a few hands-on activities. Some projects involve the whole class, while others are done in small groups or individually. At high school level activities may include researching trash statistics, documenting local history through interviews or writing essays about a community scavenger hunt. Classes are designed to help diverse students become college and career ready after high school.

Children can be introduced gradually to basic scientific concepts that will provide frame work for understanding and connecting many scientific facts and observations. Science makes the children very simple through the five concepts that is

- i) Systems, Order and Organisation,
- ii) Evidence, Models and Explanations,
- iii) Change, Constancy and Measurement,
- iv) Evolution and Equilibrium and
- v) Forms and functions.

Our communities offer many opportunities and resources to help children learn science including zoos, museums, planetariums, aquariums, farms, science at works, community science

groups and organization and other community resources which are the botanical gardens, weather stations, hospital laboratories, sewage treatment plants, news paper plants, recycling centers and radio and television are few of the kinds of places in your community where your child can learn more about all kinds of science.

We all must inculcate within us scientific attitude and scientific temper. Nowadays science is used in every fields. Science programs can be found on networks, on cable or satellite channels such as Discovery Channel, the learning channel, the national geographic channel as well as on public television stations. Through the internet your child have access to avast array of science resources. Most of the resources are both educational and entertaining. Web sites are also helpful to find any information related to your topic. Science camps help the students to focus on different fields of science and technology.

Project based learning students also learn skills that are essential in higher education. The students learn more than finding answers. It allows them to expand their minds and think beyond what they normally would. Students have to find answers to questions and combine them using critically thinking skills to come up with answers. In PBL, project science is a community culture, the students group themselves resolve their understanding of phenomena with their own knowledge building. So in this era, students have to learn science in a new creative and innovative way that is through project based learning. In this learning students express their views and ideas in groups and try to collaborate it with various groups.

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## PROJECT BASED LEARNING

**Ms. M. Lalitha Rajeswari**  
St. Xaviers High School. Airoli

It is a type of learning that involve students working together in small groups to complete projects. These projects give students the opportunity to explore real -life challenges and problems and develop cross- curriculum skills in innovative ways. The purpose of project based learning is to engage students in the active process of creating knowledge rather than simply treating them as passive receivers of knowledge.

### The key features of PBL

1. **Cooperative** : Small groups of students are require to complete a certain task or project together. It helps them to interact and work with one another. There may be possibility of arising disagreement among the members, but it can be ignored.
2. **Constructive**: It encourage students to construct sets of knowledge and skills for themselves.
3. **Subjective** : It helps the students to achieve distinct solutions to specific problems.
4. **Responsive** : When students evaluate a problem, they can generate a possible solution.

### How can PBL be assessed ?

The assessment includes the followings :

To measure the acquisition of knowledge skills and dispositions.

**Knowledge** : Finding interrelationship among facts and concepts.

**Skills** : It involves critical and creative thinking, effective collaboration and versatile communication.

**Dispositions** : Includes internal learning.

Even educator must encourage the students to become thoroughly engaged and responsive to both the material and the procedures of PBL., otherwise students may fall prey to negative possibility of being disengaged and unresponsive to both.

### Portfolio Assessment :

It is defined as collected works and reflections of students that demonstrate their growth along the process. It is a integral part of the learning cycle. It is maintained both during and at the end of project.

### Analysis for project :

It includes

1. The basic concept selected by the students
2. The brief discussion on project
3. Needs : Tasks, Technology and media used.



4. Presentation and evaluation
5. Method of presentation utilized.
6. Implementation and data gathering.
7. Discussion and creative evaluation.
8. Conclusion
9. reference and bibiligraphy used.

### **The management of BPL**

The primary challenge of project management is to achieve all the project goals and its objectives while honouring the preconceived constraints. The primary constraints are scope, time, quality and budget. The secondary challenge is to optimize the allocations of necessary inputs and integrate them to meet predefined objectives.

### **The value of project management**

It includes

1. Completing projects more quickly and cheaply
2. Finding better solution through better planning
3. More focus on metrics and facts based decision making.
4. Improve work environment
5. Saving effort and costs

### **Benefits of PBL and Conclusion**

1. Increases motivation to learn
2. Develop critical thinking writing and communication skills
3. Enhances retention of information
4. Provides a model for life long learning
5. Demonstrates the power of working cooperatively.

It leads the students to realize the intended course learning outcomes so the PBL helps in "sustaining the doing, supporting the learning.

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## KEY SUCCESS FACTORS FOR PROJECT WORK

**Frida Moses**

St. Xaviers High School. Airoli

Project management techniques and planning tools are useful for any tasks in which different outcomes are possible. Where risks of problems and failures exist and so require planning and assessing option and organizing activities and resources to deliver a successful result. Projects can be various and shapes and sizes from the small and straightforward to extremely large and highly complex.

In organizations and business, project management can be concerned with anything particularly introducing or changing things, in any area or function, for example

- ◆ People, staffing and management
- ◆ Material, manufacturing and production
- ◆ Plant, vehicle and equipment
- ◆ Buildings and premises
- ◆ Purchasing
- ◆ Sales, selling and marketing
- ◆ Customer service and relations
- ◆ Legal and professional
- ◆ Technical, scientific research and development an anything else which needs planning and managing within originations.
- ◆ Products and services
- ◆ IT and communications
- ◆ Storage, distribution and logistics
- ◆ Finance, administration, acquisition and divestment
- ◆ Human resources development and training
- ◆ Quality, health and safety

Successful project management, for projects large or small, tends to follow the process outlined below. The same principles, used selectively and appropriately also apply to smaller tasks. Project management techniques are not just for project managers - they are available for anyone to use.

### Project Management Process

1. Agree precise specification for the project-terms of reference"
2. Plan the project - time, team, activities, resources financial- using suitable project manage ment tools
3. Communicate the project plan to your project team and to any other interested people and groups.
4. Agree and delegate project actions
5. Manage and motivate - inform, encourage enable the project team
- 6 Check, measure , monitor, review project progress- adjust project plans and inform the project team and others.
7. Complete project- review and report on project performance, give praise and thanks to the project team.
8. Project follow-up-train, support, measure and report results and benefits.

#### 1. Agree precise specification(terms of reference) for the project --

The project manager must consult with others and then agree the project specification with superiors or with relevant authorities. The specification may involve several drafts before it is agreed.

A project specification is essential in that it creates a measurable accountability for anyone wishing at any time to assess how the project is going or its success on completion. Project terms of reference also provide an essential discipline and framework to keep the project on track, and concerned with original agreed aims and parameters.

## **2. Plan the project**

Plan the various stages and activities of the project. Where possible, involve the team in the planning. A useful tip is to work backwards from the end aim, identifying all the things that need to be put in place and done, in reverse order. Additionally, from the bare beginnings of the project use brainstorming to help gather points and issues and to explore innovations and ideas.

## **3. Communicate project plan to your team**

This serves two purposes – it informs people what's is happening and it obtains essential support, agreement and commitment. If the project is complex and involves a team then one should involve the team in planning process to maximize buy-in ownership, and thereby accountability. The project will also benefit from input and consultation from relevant people at an early stage.

## **4. Agree and delegate project actions**

The plan will have identified those responsible for each activity. Activities need to be very described, including all relevant parameters, time scales, costs and deliverable. Using proper delegation methods is vital for successful project management involving teams.

## **5. Manage, motivate, inform, encourage enable the project team.**

Manage team and activities in meetings, communicating, supporting and helping with decision. Praise loudly, blame softly. One of the big challenges for a project manager is deciding how much freedom to give for each delegated activity.

## **6. Check, measure and review project performance, adjust project plans, inform project team and others.**

Check the progress of activities against the plan. Review performance regularly and at the stipulated review points and confirm the validity and relevance of the remainder of the plan. Adjust the plan if necessary in light of performance, changing circumstances and within the original terms of reference.

## **7. Complete project, review and report on project, give praise and thanks to the project team**

At the end of the successful project hold a review with the team. Ensure to understand what happened and why. Reflect on any failures and mistakes positively, objectively and without allocating personal blame. Reflect on successes gratefully and realistically.

## **8. Follow-up-train, support, measure and report project results and benefits.**

Traditionally this stage would be considered part of the project completion, but increasing an emphasized additional stage of project follow-up is appropriate. □ □ □

## ASSESSMENT OF STUDENTS LEARNING DURING PROJECT

**Ms. Samreen Shaikh**

St. Xaviers High School. Airoli

Assessment of student learning is an ongoing process aimed at understanding and improving student learning. It involves setting goals and standards for student learning and then systematically gathering and analysing evidence to determine how well student performance matches those expectation and standards. The main goals in the assessment of student learning are to document what learning is taking place and to use results of assessment activities to improve student learning.

Project is one of method of teaching. Project can be done alone or within the peer group also. Here students are involved in investigation of completing problems that culminate in authentic products. It is used of in depth and rigorous classroom project to facilitate learning and assess student competence.

Assessment of students learning during project involves classroom assessment techniques and peer group assessment is an approach designed to help teachers find out what students are learning in the classroom and how well they are learning it. Where as per grouped assessment helps to teacher to find out each an every student capabilities and likes and dislikes.

Assessment of student learning classroom project has many benefits. It offers wide range of benefits to both students and teachers. A growing body of academic research supports the use of project - based learning in school. To engage students , cut absenteeism, boast. Cooperation teaching skills and improve academic performance.

For students benefits of project based learning include increased attendance growth in self-reliance, improved attitude toward learning, opportunities to develop complex skills such as higher order thinking, problem solving skills, collaborating and communicating etc.

This assessment of student- learning during projects can be applicable to most school subjects such as science, maths, history, geography etc. In such subject assessment of students give us chance to know better the students talents hidden in him. Then accordingly we can guide that particular students. We can even come to know his/her ability of thinking. In science subject we can do assessment of student during project practically also. Here we are able to know these practical skill also.

So assessment of students learning during projects is one of good idea to enhance learning ability of students.

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## PROJECT MANAGEMENT : TECHNIQUES

**Ms. Soni**

St. Xaviers High School. Airoli

Problems arise in every subject. Such problems as what product to develop. These problems and their alternative solution establish some element of change. Projects are generally established to carry out these changes and someone is always responsible for each project is successful completion.

Every project is unique in term of problems that arise and the project manages attitude and style used to guide and control project activities. The subject or the topic structure implemented may not be the same structure used throughout the life cycle of the project due to change in priorities, available resources etc. Before touching on major tools and techniques of project management, let's get to the bottom of what project management truly. Later I will list the benefits that the tools and techniques of project management bring to the system analysis process.

All project solve some type of problems but project may also be established simply to determine and define feasible alternative solution to problems. Some primary characteristics of a project includes

1. **Objective** : Each has a specific goal to reach.
2. **Schedule** : Point in time in which they must be accomplished.The
3. **Complexity** : Does the technology exit to achieve the project objective.
4. **Size and nature of task** : Step by step plan of action.
5. **Resources** : Equipment, material, facilities etc.,

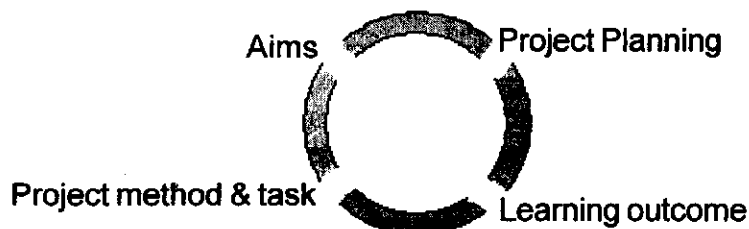
Project management is challenging task with many complex responsibilities. Fortunately there are many tools available to assist with accomplishing the task and executive the responsibilities. But project that will always generate some of the following **achievable skills** ;

1. Analytic skill
2. Communication skill
3. Critical awareness
4. Contextualization
5. Independent Judgement
6. Intellectual power
7. Intuitive power
8. Interrelative knowledge and understanding
9. Problem solving skills
10. Vocational demonstration of skills

The form of project management will be unique for every project indeavour and will change throughout the project. The management process typically includes four key phase

1. Initiating the project
2. Planning the project
3. Executing the project
4. Closing the project

We can also understand the project planning with following diagram:



While it was beyond the scope of this document to fully elucidate the practices of effective project. This brief guide has acted as introducing tool kit that will hopefully facilitate reflection, spark some ideas and guide you to relevant project. Guide and resources to enhance your current project and of adopting fresh approaches to project. It has shown approaches to the method of project that are not only educationally successful but efficient and workable the benefiting both students and teachers..

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## DAY TO DAY OBJECTS AS TOOLS FOR SCIENCE PROJECT

**Ms. Manasvi Mangesh Shigwan**  
MGM English Medium School, Nerul

Science is all - inclusive and very comprehensive and touches the life of everyone in more ways than we can imagine. It has taken huge strides during the last 4-5 decades. Its achievements, discoveries and inventions have really been fantastic and wonderful. Nation have come much closer now to one another and interdependence, cooperation and interaction among them have tremendously increased. "The whole world has now turned into a global village."

The greatness of science lies in the subject itself. It has opened the new floodgates of progress, development and achievement. It has lead to the end of all. The modern man cannot stop here. He needs to think of new and new creations, everyday and then only we can progress in all the fields. And this great responsibility lies on the young generation and the teachers.

Just for an example. A child learns the process of filtration in class IX. Teacher demonstrates the experiment using the beaker, funnel, filter paper, The child of 12 years observes that experiment. He enjoys observing it. But the next movement he is depressed as he feels the apparatus are out of his reach. His curiosity stops there. The teacher demonstrates the experiment without correcting it to the real life situations. If teacher would have demonstrated the same experiment using ordinary glass, plastic funnel and cloth or strainer the child's curiosity would have raised higher. The child may go home and perform the same experiment by himself or herself.

The teacher's role is not only to know the process or to make the child understood it but to stimulate the uryosity within the child. And this is possible only if tools used for science experiments are simple. If science teacher manage to use simple day to day objects as tools for teaching, every child in the class will learn to do self experimentations on their own after the school. This system of education will satisfy all the goals of the teaching-learning process. Teacher's role is to be facilitators and the child learn on his own. Children are natural scientist. They are full of questions, always eager to explore the world around them. You don't need much time, money or costly equipment to nurture child's curiosity. It' is enough just to take advantage of the opportunities for learning that pop us everyday. Children love turning play time into active learning. This means that once child observes the teacher he learns to do his own experiments using day to day objects. This leads to the development of scientific temper in the child.

The child takes part in the science exhibition. He or she will try to make projects or models using day to day objects. A model is representation containing the essential structure of some object or even in the real world.

Use of simple tols for making model will be more effective. In this content we must not forget Madam Curie, the only winner of the noble prize twice who has set up her own laboratory from the material collectef from rack, just and garbage. If we are successful to inculcate this habit among the children in no time Indiuua will be included in the list of developed country.

Some of the examples of day to day objects.

1. Chemical bonding shown with clay and matchstick

2. Thread model to show cell division
3. Maida and oil mixture to show electrostatic force
4. DNA model with match stick
- Plastic bottles to show air pressure
6. Empty refills to show Carbon compounds
7. Soap water and bangles to show concave and convex lenses.

This will help the child to explore new knowledge and create new things from the space and material available with him. Also it will help the child to invent new ways to reduce, reuse and recycle the waste. The technologies ( products) generated as a result of use of day to day objects will be within the reach of common man ( low cost). And will reduce the burden on natural resources and add to the nation's economy.

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## PROJECT MANAGEMENT TECHNIQUES

**Ms. Poornima C.**  
St. Xaviers High School. Airoli

A task does not necessarily have to be called "Project" in order for project management methods to be very useful in its planning and implementation. Even the smallest task can benefit from the use of a well-chosen project management technique or tool, especially in the planning stage. Any task that requires some preparation to achieve a successful outcome will probably be done better by using a few project management methods somewhere in the process. Project management methods can help in the planning and managing of all sorts of tasks, especially complex activities.

Project management is chiefly associated with planning and managing change in an organization, but a project can also be something unrelated to business even a domestic situation, such as moving house or planning a wedding.

In organizations and business, project management can be concerned with anything, particularly introducing or changing things, in any area or function for example:

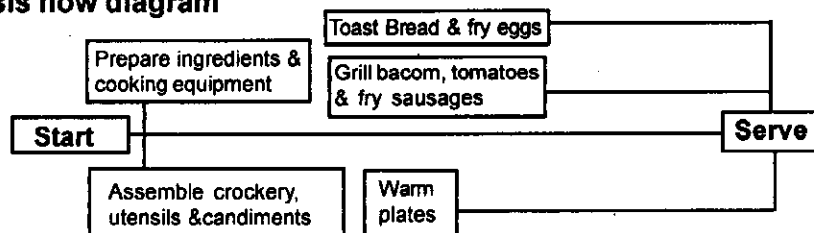
- ✓ People, staffing and management
- ✓ Materials, manufacturing and production
- ✓ Plant, vehicle, equipment
- ✓ Building and premises
- ✓ Finance, administration, acquisition and divestment
- ✓ Quality, health and safety
- ✓ Technical, Scientific research and development
- ✓ and anything else which needs planning and managing within organization.
- ✓ Process and services
- ✓ IT and communications
- ✓ Storage distribution and logistic
- ✓ Purchasing
- ✓ Customer service and relations
- ✓ Legal and professional
- ✓ New business development

Successful project management, for projects large or small, tends to follow the process outlined below. The same principles, used selectively and appropriately, also apply to smaller tasks,

### Project Management Process

1. Agree precise specification for the project
2. Plan the project - time, team, activities, resources, financial - using suitable project management tools.
3. Communicate the project plan to our team and to any other interested people and group.
4. Agree and delegate project actions
5. Manage and motivate- inform, encourage, enable the project team.
6. Check, measure, monitor, review project progress- adjustment project plans

### Project critical path analysis flow diagram



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## PROJECT BASED LEARNING

**Ms. Ritu Sarvahi**

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An old Chinese proverb states :

***I hear and I forget,  
I see and I remember,  
I do and I understand.***

Project based learning process is heart of education. On it depends the fulfillment of the aims & objectives of education. It is most powerful instrument of education to bring about desired changes in the students. Project-based learning is a dynamic approach to teaching in which students explore real-world problems and challenges. With this type of achieve and engaged learning, students are inspired to obtain a deeper knowledge of the subjects they are studying. Individual students may be better suited to learning in a particular way, using distinctive modes for thinking, relating and creating. The notion of students having particular learning style has implications for teaching strategies. Because preferred modes of input and output vary from one individual to another, it is critical that teachers use a range of teaching strategies to effectively meet the needs of individual learners. The project should incorporate a variety of teaching methods intended to complement the learning styles of children. This should lead to young learners who are both intrinsically and extrinsically motivated to inquire, infer and interpret: to think reflectively, critically and creatively: and in the final analysis to make use of the knowledge and skills they have gained by becoming effective decision makers. A student - centered approach which actively engaged the young person in the learning process is critical if skills which results in healthy behaviors are to be fostered and developed

Only in the act of doing does one discover that process is more important than the product. It is in the process that learning takes place. Having had their own experiences in the creative expression students become more sensitive and well- rounded persons. Projects may take various forms and shapes. When a given project closely approximates the activity for which a class is preparing the students, the value of learning by doing makes this method an extremely significant one. Projects introduce the dimension of fun into learning. This is important not only in teaching children but facilitates education at all age levels. Not all projects are fun, but dimension of interest is certainly heightened when student involvement on a realistic and experimental plane is set into motion. In this course of developing the project, students decide on an approach by gathering and evaluating data from a variety of print, multimedia or Internet sources. They analyze and synthesize the information they have gathered and- -in a cooperative effort- they determine the direction the project will take. Often the process is interdisciplinary in nature, and various skills and interests in the group becomes an asset. Student then design and create their project and learn to solve specific problems in the process. Technology can also play role in the project, students may use spreadsheets, electronic publishing, databases, email, and forums for research and communication. Remember that the project has two dimensions. The learning process which results from the participation, and the end result which has value to the class and /or other people. When junior high class goes visiting in the senior citizens home, the lass learns about witness and sharing with others and the elderly folks benefit from their visit and inspiration the young people bring them.

The project approach fosters not only academic knowledge and skill sets but what many educators refers to as the whole child. The use of the word whole stems from research indicating that students need more than content mastery to succeed in the 21st century. They need to be physically, emotionally, and socially healthy. They need to be intellectually challenged and supported by caring adults, and they need to be interested and engaged in their school learning.

Though the project work has long prepared students for health, happiness, and success- even as far back the 16th century- it emerged recently as a prime teaching strategy of 21 the 21st century. Headlines everywhere refer to rapidly changing and more global world, and governments and organizations call upon students to lend their hands through service, innovation and problem solving. These calls to action require a new kind of education- one that inspires, connects, and empowers students. The project approach does just that by :

- connecting students to their local and global communities- and providing them with real-world experiences beyond the classroom.
- fostering what researchers refer to as essential 21st century skills, including critical thinking, collaboration and creativity.
- providing opportunities to integrate technologies into the classroom- and to use technologies as tools for achieving specific purposes instead of as ends in themselves.

This is important to evaluate all aspects of the learning process through projects. Evaluation of the projects should be include consideration of the following- the timing, the teaching strategies, the amount of information, the environment, and whether the objectives were met. The teacher should use feedback from learner evaluations to modify the present teaching activities. Project- based learning is an instrumental method in which students learn a range of skills and subject matter in the process of creating their own projects. Sometimes, these projects are solutions to a real - world problem. But what is most important in project-based learning is that students learn in the process of making something. They work in groups and bring their own experiences, abilities, learning styles and perspectives to the project. Project - based learning develops students' skills in learning styles and perspectives to the project. Project based learning develops students' skills in areas such as problem-solving, critical thinking, visualizing, decision- making, cross- cultural understanding, and reasoning, as well as in written and oral communication. Students engaged in project- based learning take responsibility for their own learning and in so doing become lifelong learners. They also develop better interpersonal and communication skills. Project based learning recognizes the varying abilities of the students, allowing them to draw from their individual strengths to work in areas of their own interest, thus giving them the opportunity to achieve at higher level.

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## KEEPING THE RELEVANCE AND FOCUS OF THE PROJECT

**Ms. Neena Francies**

Sacred Heart High School, Vashi, Navi Mumbai

**“ KNOWLEDGE IS POWER, BUT LITTLE KNOWLEDGE IS DANGEROUS”** We had recipe of education, we took that to market for too long and we got caught with that i.e. tests and formulas which are obsolete learning models today. India produces less employable graduates not because of lack of subject expertise but due to lack of soft skills, that are difficult to teach.

Today's generation are exposed to technology. For them 'seeing is believing' and 'learning by doing' are their concepts of education,. We will have to think of a different strategy because the old style of education will not help. Today's teachers have an additional task, besides imparting knowledge they are expected to mentor each individual in their case. It is important to look at technology to change the game. Technology itself does not change the things, its the people who use it in a new way so as to accelerate and mobilize young minds about having a clear, intelligent and rigorously pursued performance mechanism.

Things always fell down but the apple that fell on Newton's head made all the difference. It ignited the curiosity in an average child like Newton to find the reason and behold. We have a law. The hardware of education is all about having three things, having a point of view towards the future, having strategic clarity and building execution capabilities to implement. Getting the hardware right is sufficient condition for success. Beyond that, you need to have the ability to create a sense of purpose of the learning. Projects in science and other subjects include all the above and make the teaching/ learning process innovative and effective.

In every sector the engine of growth is at the bottom of the pyramid and is it in education. Education has to evolve and understand how it is going to stay relevant, affordable and create things which are going to be important to the current and the future generation. The first machines invented found their use in spinning cotton yarn, the steam engine found its first use in hauling coal, chemical synthesis found its first use in textile dyes, electricity found its first use in the electric motors in factories, the internal combustion engine found first use in farm tractors. From these starting points each of these technological innovations found applications in broader sectors of human society i.e. the steam engine made long distance shipping possible, chemical synthesis brought synthetic fertilizers and pharmaceuticals, electricity lit homes and extended the day and the internal combustion engine made personal transportation affordable by all.

Projects, be it big or small can ignite young minds. For, through them children are made to understand there is a book outside the text book. Let us make science more fun and enjoyable for our children, where, the potential energy in the form of ideas get converted to kinetic energy of techniques, innovations and inventions. Let us be winds to change to fulfill the potential of India or the world at large in the coming years. Ultimately, knowledge with understanding leads to success, gives one confidence, confidence builds one's personality. If we succeed in making a human being with the right attitude can shape or contribute to the welfare of the world at large then we have accomplished our vision of imparting true education. Let us make our learning redundant and let the benefit of technology percolate to each and every individual entrusted to us. So what are we waiting for. Let us grab a boat and sail into uncharted waters and go where no one has gone before because **“ CURIOSITY SE BADKAR KOI TEACHER NAHI”**

## KEY SUCCESS FACTORS FOR PROJECT WORK

**Ms. Nilofer Shakil Shaikh**

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**Abstract :** Most people have an intuitive for what success is, but defining it and measuring it is a bit tougher. The common theme in all cases was that project success was defined in way that could be measured the day project was finished. Projects are not so very different actors. In order to measure success, we must first define it.

**Introduction :** What is a project ? A project is a combination of human and nonhuman resources pulled together in a temporary organisation to achieve a specified purpose. A project ,then can be defined as possessing the following characteristics:

1. A defined beginning and end ( specified time to completion).
2. A specific preordained goal or set of goals.
3. A series of complex or interrelated activities.
4. A limited budget.

### Dimensions of project success

In same way that quality requires both conformance to the specifications and fitness for use, project success requires combination of product success and project management success:

- Was the project ( outcome) of the project a success?
- Was the project well= managed?

Simple yes-or-no answers will not suffice. We should not be asking" was your project a success?. We should be asking" how successful was your project?.

### Beyond on time

Project teams are fond defining schedule success as on time. A lovely concept to be sure, but essentially useless from a management perspective. Here are some very basic questions that this phrase does not answer:

- Is it okay to be one day late? One week? One month?
- If we early, is that bad?
- Are we measuring against the original schedule or the current base line?

### What is successful project implantation?

A project is generally considered to be successfully implemented if it:

- Comes in on-schedule( time criteria)
- Comes in on-budget ( monetary criterion)

Achieved basically all the goals originally set for it. ( effective criterion)

Is accepted and used by the clients for whom the project is intended ( client satisfaction critrion). While planning for any project one should consider following points for the successful excusion:

1. The first factor is underlying purpose for the implementation and classified as **Project Mission** : clearly defining goals at the outset of the project.
2. The second factor is support from team mates.
3. The third factor to be classified was that of **project schedule plans**. Project schedule refers to the importance of developing a detailed plan of the required stages of the implementation process.
4. The fourth factor that was determined is labeled Client Consultation. The " client " is referred to here as anyone who will ultimately be making use of the result of the project, as either a customer outside the company or a department within the organization.
5. The fifth facto concerned with *personnel* issues. An important but often overlooked, aspect of the implementation process concerns the nature of the personnel involved. In many situations, personnel for the project team are chosen with less-than- full regard for the skills necessary to actively contribute to implementation success.
6. The sixth factor to discussed was labeled Technical Tasks. It is important that the implementation be well managed by people who understand the project. In addition, there must exit adequate technology to support the project.
7. The seventh factor to be considered is that of *Monitoring and feedback*. Monitoring and feedback refer to the project implementation, key personnel receive feedback on how the project is comparing to initial projections. Making allowances for adequate monitoring and feedback mechanisms, and to ensure that no deficiencies are overlooked.
8. The eight factor was that of *communication*. The need for adequate communication channels is extremely important in creating an atmosphere for successful prtoject implementation. Communication is not only essential within the project team itself, but between the team and the rest of the organisation as well as with the client.
9. The ninth and final factor to emerge from classification of the model is *trouble shooting*.

### The project cycle

The project's life cycle has been divided into four distinct stages, including :

1. Conceptualization. 2. Planning 3.Execution 4. Termination

### Conclusions

As with any other too or technique, project sucess measures can be overdone. Use of following checklist helps to ensure sucess of project

- Complete - anytuhing unmeasured is likely to becompromised.
- Relevant- variances clearly indicate a need for corrective action
- Valid- measuring what you intended to meassure.
- Easy to understand - so that people will accept them.
- timely - in comparison to the result measured..

The botton-line is " **Team Work and dedication is must to complete the project on time with successful excusion**"

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## THE KEY SUCCESS FACTORS FOR PROJECT WORK

**Ms. Farida Sohail**  
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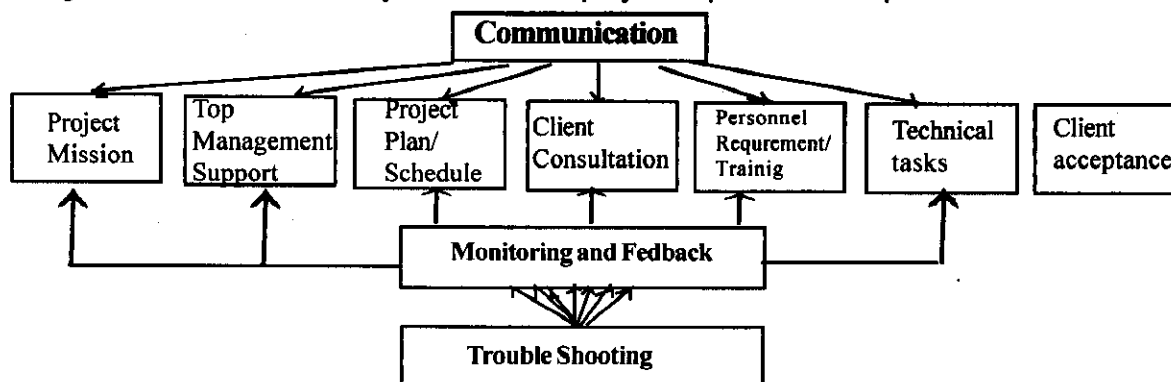
While almost everyone has had experience with project in one form or another. A project is an organization of people dedicated to a specific purpose or objective. Projects generally involve large, expensive, unique or high risk undertaking, which some expected level of performance.

A project is combination of human and nonhuman resources pulled together in a temporary organization to achieve a specific purpose. Now what is successful project factors?

A project is generally considered to be successful, if it -

- ◆ comes in on -schedule ( time criterio)
- ◆ comes in on -budget ( monetary criterio)
- ◆ achieves basically all the goals originally set for it ( effective criterio)
- ◆ Is accepted and used by the clients for whom the project is intended (Clent satisfacion criterio )

Figure below shows the key factors of the project implementation profile.



1. These factors appears to be both time sequenced and interdependent. Conceptually, one could argued that the factors are sequenced to occur ( or be considered) in a logical order instead of randomly or concurrent. For instance according to the framework, it is first important to set the goals or define the mission and benefits of the project before seeking top management support. Furthermore, one could argue that unless consultation with the projects clients has occurred early in the process, chances of subsequent client acceptance and use, denoting successful implementation will be negatively affected. Nonetheless, it is important to remember that in actual practice, considerable overlap and rehearsal can occur in a the ordering of the various factors and the sequencing as suggested in the frame work is not absolute.

2. The factors for a project implementation can be laid out on a critical path. In addition to the set of seven factors along the critical path, ranging from project mission to client acceptance, other factors such as communication and monitoring and feedback are hypothesized to necessarily occur simultaneously. And in harmony with the other sequential factors. It is important that communication always occur or that trouble shooting be available throughout the implementation process.

3. The model allows the manager to actively interact with and systematically monitor his project. The sequence of a project implementation is an important consideration for any project manager. Not only are there a prescribed set of steps to be taken in the project implementation process, but because of the order of the steps to be taken, the manager is provided with a checklist for determining the status of the project at any given stage. This monitoring capacity enables the manager to determine where the project is in terms of its life cycle and how rapidly it is moving toward. Further the manager has the ability to determine the chances for successful implementation given attention has been paid to the proper sequencing of steps and consideration of relevant critical success factors in the implementation process.

Further, the factors can be grouped into meaningful patterns or more general subdimensions. The first three factors out of seven are related to planning phase of the implementation of process.

The second dimension, composed of the other seven factors may be seen or action of the implementation. These factors seen less planning in nature and more based on the operationalization of the project implementation process.

The planning versus action elements in the critical implementation success factors shown significant parallel to the distinction between strategy and tactics in the strategic management field.

Strategy is often viewed as the process of deciding on overall organizational objectives as well as planning or how to achieve those goals.

Tactics are seen as the deployment of a wide variety of human, technical and financial resources to achieve those strategic plans. Strategy then concerned with the upfront planning, while tactics are specifically focused on how best to operationalise or achieve those plans.

It is important that managers understand the differences between strategic and technical issue. Both are vital to project success, but differentially so as the project moves forward to completion.

Strategic issues are more important at the beginning of the project. Tactical issues become more important towards the end. Then all the above factors should be considered for the success of project work.

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## PROJECT MANAGEMENT TECHNIQUES

**Ms. Bharati Nimbalkar**  
St. Xavier's High School, Airoli

A task does not necessarily have to be called a "Project" in order for project management methods to be very useful in its planning and implementation. Even smallest task can benefit from the use of well chosen project management technique or tool, especially in planning stage.

Any task that requires some preparation to achieve successful outcome will probably be done better by using a few project management methods somewhere in the process. Project management methods can help in the planning and managing of all sorts of tasks, especially complex activities.

### Project Management Process

1. Agree precise specification for the project teams of reference.
2. Plan the project time team, activities, resources, financial using suitable project managements tools.
3. Communicate the project plan to your project team and to any other interested people and groups.
4. Agree and delegate project actions.
5. Manage and motivate - inform, encourage enable the project team.
6. Check measure, monitor, review project process - adjust project plans and inform the project team and others.

**Agree precise specification :** Often called project "terms of reference".The project specification should be an accurate description of what the project aims to achieve and the criteria and possibilities involved its parameters, scope range outputs sources , participants, budgets and time scales. This is the stage to agree special conditions or exceptions with those in authority. Once you have published the terms of reference , you have created a very firm set of expectations by which you will judged. So if you have any concerns or negotiate. now is time to do it.

**Plan the project:** Plan the various stages and activities of the project where possible involve your team in the planning. A useful tip is the work backwards from the end aim, identifying all the things that need to be put in place and done in reverse order. Additionally from the bare beginnings of the project use brain storming to help gather points and issues and to replace innovations and ideas.

**Project time scales and costs :** Most projects come in late that is just way it is. So do not plan a time scale that is over ambitious. Ideally for plan for some slippage or runway into each phase of project. Investors and executives tend rarely to question an over ambitious plan but they will quickly make very ruthless decision when any overly ambitious projects starts to fail. Executing a little realism at the outset of a project regarding financial and time scales can save an enormous amount of trouble later.

**The project team :** Another important part of planning stage is picking your team. Take great care especially if you have team members imposedd on you. by the project chief. Selecting and gaining commitment from the best team members whether directly employed freelance contractors, suppliers,consultants or other parters is crucial to the quality of the project and ease with which it is able to manage it.

**Project management tools :** Brainstorming is usually the first crucial creative stage of the project management and project planning process. See the brain storming method in details and explained separately because it many orther useful applications outside of project management.

**Fish bone diagram:** Fish bone diagrams are chiefly used in quality management fault detection and in business process improvement., especially in manufacturing and production but the model is also useful in project management, planning and task management. Ishikawa's diagrams became known as a fish bone diagram obviously because it looks like a fish bone.

**Project critical path analysis :** Critical path analysis sounds very complicated but it's very logical and effective method for planning and managing complex projects. A critical path analysis is also called critical path method which is specialized method for identifying related and interdependent activities and events, especially where a big project may contain hundreds or thousands of connected elements. Critical path analysis flow diagrams are very good for showing interdependent factors whose timings overlap or coincide. Gantt charts are extremely useful project management tools.

**Project Contingency planning :** Planning for and anticipating the unforeseen or the possibility that things may not go as expected is called contingency planning.

**Communicate the project plan to you team :** Project team can extend more widely than you might first imagine. And it obtains essential support agreement and commitment. Also consider how best to communicate the aims and approach of your project to others in organization and wider network.

**Argue and delegate project actions: :** Activities needed to be very closely described. including all revent parameters time scales, costs and deliverables.

**Manage, motivate, inform, encourage, enable the project:** Use empathy and conflict handling techniques and lookout for signs of success and manage it accordingly.

**Check measure and review project performance, adjust project plans Inform project team and others :** Review performance regularly and at the stipulated review points and confirm the validity and relevance of the remainders of the plan.

**Follow up, train, support, measure, and report project results and benefits :** Traditionally this stage would be considered part of project completion but increasingly an emphasized additional stage of project follow-up is appropriate. When you are focussed on project management it is easy to forget or ignore that many people are affected it is easy to forget or ignore that many people are affected in some way by the results of project. Change is difficult even when it is good and for right reasons. Remembering this during and at the end of your project will help you achieve a project that is well received, as well as successful purely in project management terms.

**Complete project, review and report on project give please and thanks to the project team :** Set end of your successful project hold review with the team. Ensure you understand what happened and why. Reflect on any failures and mistakes positively, objectively and without allocating personal blame.

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## PROJECT MANAGEMENT TECHNIQUES

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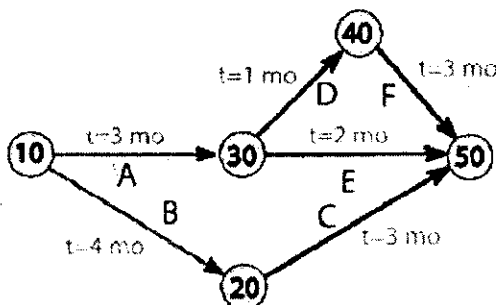
**Abstract :** Project Management is the discipline of planning, organizing, motivating @controlling resource to achieve specific goals. A project is a temporary endeavour with a defined beginning and end undertaken to meet unique goals and objects, typically to bring about beneficial change or added value. The temporary nature of projects stands in contrast with business as usual which are repetitive, permanent or semipermanent functional activities to produce products or services. In practice, the management of two system is often quite different and as such require the development of distinct technical skills and management strategies.

The primary challenge of project management is to achieve all the project goals and objectives while honoring the preconceived constraints. The primary constraints are scope, time, quality and budget. The secondary & more ambitious challenge is to optimize the allocation of necessary inputs & integrate them to meet predefined objectives.

**History :** Until 1900 civil engineering projects were generally managed by certain architect, engineers and master builder themselves, for example Vitruvius ( First century BC), Christopher Wren, Thomas Telford and Isambord kingdom- Brunel. It was in the 1950s, that organizations started to systematically apply project management & technique to complex engineering projects.

As a project management developed from several field of application including civil construction, engineering and heavy defence activity. The forefathers of project management are Henery Gantt called the father of planning and control techniques who is famous for his use of the Gantt chart as project management tool Henri Fayol for his creation of the five management functions that form the foundation of the body of knowledge associated with project and project management. Both Gantt and Foyal were students of Frederick Winston Taylor's theories of scientific management. His work is the forerunner to modern project management tools including work breakdown structures and resource allocation.

The 1950s marked the beginning of the modern project management era where core engineering fields come together to work as one. Project management become recognized as a distinct arising from management engineering model. In the Unites States, prior to the 1950s project were managed as an adhoc basis using mostly Gantt charts & informal techniques & tools. At that time two mathematical project - scheduling models were developed as a joint venture between Supent Corporation and Remington Rand Corporation for managing plant maintenance projects. And the Program Evaluation & Review Technique or PERT was developed by Booz Allen Hasmlton as part of the United States navy's Polaris missile submarine program. This mathematical techniques quickly spread into many private enterprises.



**PERT Network Chart for a seven-month project with 5 milestones**

At the same time project scheduling were being developed technology for project cost estimating, cost management and engineering economics was evolving with pioneering work by Hans Zang & Others. In 1956 the American association of Cost Engineers , association for the advancement was formed by early practitioners of planning & scheduling , cost estimating and cost/ schedule control. AACE continued its pioneering work for portfolios, programs & project management.

The International Project Management Association (IPMA) was founded in Europe in 1967 as a federation of several IPMA maintains its federal structure today and now includes member associations on every continent except Antarctica. IMPA offers a four level certification program based on the IMPA Competence Base line (ICB). The ICB covers technical, contentual and behavioral competencies.

In 1969 the project management institute was formed in the USA. PMI publishes a guide to the project management body of knowledge which described project management practices that are common to most project, most of the PMI also offers multiple certifications.

## **Approaches**

There are number of approaches to managing project activities including lean, iterative, increment & phased approaches. Regardless of the methodology employed, careful consideration must be given to the overall project objectives, timeline & cost as well as the roles and responsibilities of all participants and stakeholders.

### **The traditional approach**

A traditional phased approach identifies a sequence of steps to be completed In the traditional approach five development components of a project can be distinguished.

1. initiation 2. Planning and design 3. Execution and construction 4. Monitoring and controlling system 5. Completion.

Not all projects will have every stage as project can be terminated before they reach completion. Some projects do not follow a structured planning or monitoring process. And some projects will go through steps 2,3 74 multiple times.

Many industries use variations of these project stages.. When working on a brick and mortar design and construction, project will typically progress through stages like pre-planning, conceptual design, schematic design, design development, construction drawing and administration.

In software development, this approach is often known as the water fall model i.e. one series of task after another in linear sequence. Waterfall development works well for small, well defined projects but often fails in larger projects of undefined and ambiguous nature.

In projects where requirement have not been finalized and can change requirement management is used to develop an accurate & complete definition of the behavior of software that can serve as the basis of software development. While the terms may differ from industry to industry the actual stages typically follow common steps to problem solving defining the problem, weighing options, choosing a path implementation & evaluation.

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## IMPORTANCE OF MEASUREMENTS AND ANALYSIS IN PROJECT WORK

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### Motivation

During my interaction with students during various school, district and state level project work, it has been observed that enough attention is not paid to data collection or measurements during experiments. Many of the projects displayed show how the projects work but are not supported by any measurements. Thus the students usually depend on borrowed values which can not be replicated by their projects.

During the analysis of the essays submitted for the teachers' conference, it was surprising that among 21 essays not a single essay dealt with the sub-theme of "Methods For Measurements, Analysis And Numerical Output For Projects". This resulted in the writing of this paper.

During examining the projects, a need for modifying the evaluation system was also felt so that a higher weightage is given to the measurement and analysis of data. Revised evaluation criterion is also recommended

### Introduction

Navi Mumbai Science Foundation (NMSF) has the proud privilege of judging the largest number of project from any area in the state. These are as follows:

Year	2009	2010	2011	2012
No. of projects	310	263	259	302

Navi Mumbai is also a very important educational hub with schools of various categories - International, National, State and Municipal schools, trying to impart scientific knowledge to the students. It also has a very large well educated population who do not compromise on the education of their children. Considering all the positive factors, this area can rightly aspire to reach the national level.

In this article, I will try to highlight some of the aspects which can make our projects better. It will be my effort to keep the broad parameters as per the guidelines of National Children Science Congress (NCSC) to avoid dealing with new ideas and processes'

### Elements of a Project work

The NCSC activity guide book includes the following diagram demonstrating the scientific method. It also lists the criterion for a good project work. These are:

- Proper understanding and definition of the problem undertaken
- Quality and quantity of work, including team work, learning process, subject understanding and effort to validate the data collected

- Relevance of the proposal to the community/ school and its impact
- Originality, innovation and creativity shown to understand the problem and find solution

It is to the credit of the teachers' and the students that they are able to identify the projects relevant to the topic and prepare good displays. Even the relevant issues are well understood. However, the devil is in the detail !!!

#### **Areas for Improvement (AFI):**

The major areas for improvement can be listed as follows:

1. Conceptual understanding of the scientific words used
2. Analysis of the data collected from internet for a similar project before accepting it as true.
3. Own data collection, measurements and analysis
4. Drawing relevant conclusion and examining them against the expected result
5. Identifying the cause for variation and correcting it

It will be quite in order at this point to highlight the above

#### **Conceptual understanding**

##### **Energy**

Theme for the 2012-13 NCSC projects has been **Energy: Explore, Harness and Conserve**. During interaction with students, a lack of understanding of the concept of energy was evident. Most of the projects were related to electrical energy by solar, wind, hydro or other forms of eco-friendly energy sources. **Energy was most of the time equated to Voltage**. This resulted in a ridiculous situation where the energy could be enhanced if the voltage was doubled. Even the understanding of the **law of conservation of energy** and its impact on their project work was never examined.

Various words like **Work, Energy, Force, Power** seem to carry the same meaning. It is therefore necessary to communicate the actual scientific meaning of these words in simple understandable manner. This motivated me to prepare a module, contents of which are attached as appendix to this paper.

##### **Data from Internet**

Internet is a powerful tool and the students doing project work will definitely use it for understanding the issues, project work and even written material and photographs in many cases. This has to be accepted with the rider that this is applied with knowledge and ownership. The student need to understand and validate the data himself. For example a student presenting a wind energy project stated that the wind mill can generate enough energy such that if a battery is charged for 40 hours, it can meet the supply requirements of a town for a year. But he was unable to explain the size of the wind farm, size of the battery or even the size of the town or their annual energy consumption.

### Own data collection and its analysis

In case of a project, I consider this as the most important part since this is the only way he can validate his concepts and borrowed data/ information. **If project display is the body, the data collection and its analysis is its soul.** We can not achieve much by ignoring the soul.

A school educational system, is geared to look at marks as a final approval of their ability. It will therefore be appropriate to give higher weightage to this activity. **In fact in this age of easy access to information, this can be the main differentiator.** With this in view, I suggest the following changes in the evaluation criterion of NCSC

### Evaluation criteria

S No	Evaluation criteria	Max Marks	Sub Total	Suggested
1	Originality of Idea and concept	10	35	30
2	Relevance of the project to the theme	10		
3	Understanding of the Issues	15		
4	Data collection and analysis	15	35	45
5	Experimentation/ validation	10		
6	Interpretation and problem solving attempt	10		
7	Team work	10	30	25
8	Background correction	10		
9	Oral presentation/ written report	10		
	<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>

The modified criteria is expected to increase focus on collecting and analyzing the data

### Conclusion

NMSF is committed to provide support to schools, teachers and students for better understanding of science and its application. This is a small attempt to provide guidelines for better projects for the benefit of schools from Navi Mumbai

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## Notes

A series of 20 horizontal dashed lines for writing notes.