**Peer tutoring**

Peer tutoring has been defined by Goodled and Hirst (1999) as “The system of instruction in which learners help each other and learn by teaching”. Therefore, it is a method of offering individual (one-on-one) instruction in the regular classroom by using peers (or classmates) to teach their peers. The student who teaches is the tutor and the student being taught is the tutee.

Peer tutoring has two specific benefits. First, it provides ample opportunity for individualized instruction, which is effective for all teaching situations especially for skill learning. Second, it can be motivational for both the tutor and the tutee.

**Process of Peer Tutoring**

In order to adopt tutoring in your classroom you ought to be well-oriented with the process of peer-tutoring. The process of peer-tutoring includes two phases: Planning and implementation, each having four steps.

1. Planning Peer Tutoring

* Identify the Topics: Identification of suitable topics for peer tutoring is the first and crucial step. As a teacher you have also to decide the size of a group in peer tutoring, one-to-one pairs or tutoring in small groups of four to six children. The nature and difficulty level of a topic will determine the size of a group. One-to-one peer tutoring can be used in any subject for whom the topic includes convergent information with clear right or wrong answers. However, topics requiring higher level of divergent thinking and complex in nature may not be more suitable for peer tutoring and need to be handled by the teacher.
* Prepare Instructional Materials:
* Assign Children to Pairs : Arranging children in different pair groups is the next step once the topic and instructional material is finalized. One option is to pair a high achiever with a low achiever and let the high achiever be a tutor. Another option could be reciprocal tutoring where children of comparable ability are grouped together with turns as tutors.
* Training Students to be Effective Tutors : Students just like teachers require some orientation to become effective tutors

1. Implementation of Peer Tutoring : Implementation of peer tutoring includes group presentation of the content to children, dividing children into peer groups, assigning the task to various groups, providing worksheets to reinforce the content you have just presented, specifying the time limit they have for the tutoring session and clarifying expectations from them after the tutoring session. Teacher need to constantly keep a watch and monitor the progress of work. Provide freedom to the groups to function as they wish and answer content questions only when the tutor is unable to do so. If a tutor pair is not functioning at the expected level, rearrange the pair to the advantage of children.

**Types of Peer tutoring**

Class wide Peer Tutoring (CWPT): Class wide peer tutoring involves dividing the entire class into groups of two to five students with differing ability levels. Students then act as tutors, tutees, or both tutors and tutees.

Cross age Peer Tutoring: Older students are paired with younger students to teach or review a skill. The positions of tutor and tutee do not change. The older student serves as the tutor and the younger student is the tutee.

Peer Assisted Learning Strategies (PALS): PALS, a version of the CWPT model, involves a teacher pairing student who need additional instruction or help with a peer who can assist. Groups are flexible and change often across a variety of subject areas or skills.

Reciprocal Peer Tutoring (RPT): Two or more students alternate between acting as the tutor and tutee during each session, with equitable time in each role. Often, higher performing students are paired with lower performing students.

Same age Peer Tutoring: Peers who are within one or two years of age are paired to review key concepts. Students may have similar ability levels or a more advanced student can be paired with a less advanced student. Students who have similar abilities should have an equal understanding of the content material and concepts. When pairing students with differing levels, the roles of tutor and tutee may be alternated, allowing the lower performing student to quiz the higher performing student.

**Advantages**

Peer tutoring helps in accomplishing individualized instruction.

If peer tutoring is frequently used, each child may get an opportunity to become a tutor for some activity and for other activities they may be receiving assistance. This provides an opportunity for self-evaluation to children and determine their own capacity to accept or to provide help.

It encourages self-learning and develops independent study habits, when children make plans for the work at teaching, they became more effective learners themselves.

It develops a sense of responsibility and accountability among children.

It also helps in developing mutual respect, socialization and understanding for each other as children, plan and work together.

Children take pride in teaching others and assure pride in teaching-learning.

As children become involved in teaching other children, they begin to feel good about asking for offering each other help.

Competitiveness is replaced by cooperation as students work together in learning teams.

**Team teaching**

In Team teaching a group of teachers work together, plan, conduct and evaluate the learning activities for a group of students.

It is a way of organizing staff into groups to enhance teaching.

Teams are generally made up of staff members who may represent different areas of subject expertise. They may share the same group of students and a common planning period for the teaching.

So we can say that in team teaching the participants to determine their own activities themselves.

In this way, team teaching is a well-defined system in which many teachers provide instructions collectively to the group of students.

Here the plan of teaching method, time and process is kept flexible. So that it can be modified according to the ability of teachers and students and on objectives of teaching.

**Characteristics of team teaching:-**

* Two or more than two teachers take part in teaching.
* It is based on the co-operation of the participating teachers.
* Here teachers plans, execute and evaluate the process of teaching collectively.
* Team teaching is a technique that is flexible in nature.
* In team teaching teachers get out of their own conceptual boxes and learn new approaches that will enhance their own research and writing.
* Team teaching gives professors the opportunity to teach in a different way, and to learn in a different way.
* It allows instructors to sharpen their pedagogical skills and develop new topics per research and scholarship.

**Objectives of team teaching:-**

1. To make the classroom teaching effective according to interests and capacities of students.
2. To increase flexibility in the grouping of the students.
3. To increase the quality of instructions.

**Types or Models of Team Teaching**

* Traditional Team Teaching: Teachers actively share instruction to all students.
* Collaborative Teaching: Teachers exchange and discuss ideas and theories in front of the learners.
* Complementary/Supportive Team Teaching: One teacher teaches the content; the other provides follow-up activities.
* Parallel Instruction: Teachers teach the same material to different groups.
* Differentiated Split Class: Each teacher teaches a group based on their learning needs.
* Monitoring Teacher: One teacher instructs while the other monitors student understanding.

### Advantages:-

1. It helps in creating a dynamic and interactive learning environment.
2. It inspires new ideas and sense of partnership amongst teachers.
3. Most/important utility of team teaching is that it can be used to improve the quality of instruction.
4. In team teaching the students to get the opportunity of exposure to more specialist.
5. Teachers learn from the experience and expertise of other teachers and are able to expand the scope of their teaching capacity.
6. It leads to the effective utilization of human resources and effective use of available facilities.
7. Through team teaching, the members and the students get multiple chances to participate in discussions.

### Limitations:-

* Team teaching cannot be a success if teachers do not co-operate and co-ordinate with each other.
* Group responsibility can actually turn out to be no one’s responsibility.
* Team teaching makes more demands on time and energy. Members must arrange a mutually agreeable time for planning and evaluation.
* There can be a possibility of conflict between new methods and traditionalism.

**Co-operative learning**

Cooperative Learning

Cooperative learning is just one form of classroom/student learning structure.

Cooperation -- working together to accomplish shared goals

Cooperative Learning -- the instructional use of small groups wherein students work together to maximize their own and each other’s learning

Common Elements:

* shared learning goals -- desired outcome in which the students demonstrate as a group and individually a mastery of the subject studied
* goal structure -- specifies the ways in which students will interact with each other and the teacher during the instructional session
* Positive Interdependence
  + Students have two responsibilities:
  + learn the assigned material
  + ensure that all members of the group learn the material
  + Each student should see his or her contribution as essential for group success.
  + each student makes unique contribution
  + Interdependence occurs when students cannot succeed unless all their group members also succeed.
* Structuring interdependence: common goal, joint rewards, divided resources, complimentary roles
* Individual Accountability
  + Teacher must assess (directly or indirectly) how much effort each member is contributing to the group’s work.
  + Teacher must provide feedback to groups and individual students.
  + Teacher must help groups avoid redundant efforts by members.
  + Teacher must ensure that every member is responsible for the final outcome.
* Group Processing
  + At the end of the process, students reflect to determine which member actions were helpful and which were harmful.
  + Students then make decisions about which actions to continue, change, or delete.
  + Such processing allows groups to: focus on maintaining good working relationships, learn and improve cooperative skills, provide feedback on member participation, think at a metacognitive level as well as cognitive level, celebrate success of the group.
* Social Skills
* Face-to-Face Interaction

**Benefits of Cooperative Learning**

1. Increased Achievement
2. Increase in Positive Relationships
3. Greater Intrinsic Motivation
4. Higher Self-Esteem
5. More “On-Task” Behavior
6. Better Attitudes Toward Teachers and School
7. Students take responsibility for their own learning
8. Students translate “teacher talk” into “student speak” for their peers
9. Students engage in “cognitive collaboration.” They must organize their thoughts to explain ideas to classmates
10. Students have FUN learning
11. Students social nature is used to their advantage

**PROBLEM-BASED LEARNING (PBL)**

Mathematics teachers must teach students not only to solve problems but also to learn about mathematics through problem solving. While “many students may develop procedural fluency … they often lack the deep conceptual understanding necessary to solve new problems or make connections between mathematical ideas.”This presents **a challenge for teachers.** **Problem-based learning (PBL) provides opportunities for teachers to meet this challenge.**

**Definition**

Problem-Based Learning (PBL) describes a learning environment where problems drive the learning. That is, learning begins with a problem to be solved, and the problem is posed is such a way that students need to gain new knowledge before they can solve the problem. Rather than seeking a single correct answer, **students interpret the problem, gather needed information, identify possible solutions, evaluate options, and present conclusions.** Proponents of mathematical problem solving insist that students become good problem solvers by learning mathematical knowledge heuristically.

**Theoretical background**

PBL exists as a teaching method grounded in the ideals of **constructivism** and student-centred learning. When using PBL, teachers help students to focus on solving problems within a real-life context, encouraging them to consider the situation in which the problem exists when trying to find solutions. **The majority of research examining PBL focuses on its use in medical schools, with the key features being (a) the use of collaborative small-group work, (b) a student-centred approach, (c) the teacher as facilitator and (d) the use of real-life problems as the organizing focus.**

PBL begins with the assumption that learning is an active, integrated, and constructive process influenced by social and contextual factors. In their review of the literature, Wilkerson and Gijselaers (1996) claim that PBL is characterized by a student-centered approach, teachers as “facilitators rather than disseminators,” and open-ended problems (in PBL, these are called “ill-structured”) that “serve as the initial stimulus and framework for learning”. Instructors also hope to develop students’ intrinsic interest in the subject matter, emphasize learning as opposed to recall, promote groupwork, and help students become self-directed learners.

In addition to emphasizing learning by “doing,” PBL requires students to be metacognitively aware. That is, students must learn to be conscious of what information they already know about the problem, what information they need to know to solve the problem, and the strategies to use to solve the problem. Being able to articulate such thoughts helps students become more effective problem-solvers and self-directed learners.

**STUDENTS' UNDERSTANDING IN PBL ENVIRONMENT**

The PBL environment appears different from the typical classroom environment that people have generally considered good, where classes that are well managed and students get high scores on standardized tests. However, this conventional sort of instruction does not enable students to develop mathematical thinking skills well.

Instead of gaining a deep understanding of mathematical knowledge and the nature of mathematics, students in conventional classroom environments tend to learn inappropriate and counterproductive conceptualizations of the nature of mathematics. Students are allowed only to follow guided instructions and to obtain right answers, but not allowed to seek mathematical understanding.

**In contrast to conventional classroom environments, a PBL environment**

1. provides students with opportunities to develop their abilities to adapt and change methods to fit new situations.
2. Further, students in PBL environments typically have greater opportunity to learn mathematical processes associated with communication, representation, modeling, and reasoning

**TEACHER ROLES IN THE PBL ENVIRONMENT**

Within PBL environments, teachers' instructional abilities are more critical than in the traditional teacher-centeredclassrooms.

1. Beyond presenting mathematical knowledge to students, teachers in PBL environments must engage students in marshalling information and using their knowledge in applied settings.

2. Teachers in PBL settings should have a deep understanding of mathematics that enables them to guide students in applying knowledge in a variety of problem situations.

3. Teachers with little mathematical knowledge may contribute to student failure in mathematical PBL environments. Without an in-depth understanding of mathematics, teachers would neither choose appropriate tasks for nurturing student problem-solving strategies, nor plan appropriate problem-based classroom activities

4. Teachers in PBL environments develop a broader range of pedagogical skills. Teachers pursuing problem-based instruction must not only supply mathematical knowledge to their students, but also know how to engage students in the processes of problem solving and applying knowledge to novel situations.

5. The instructor must become a tutor or “cognitive coach” who models inquiry strategies, guides exploration, and helps students clarify and pursue their research questions

6. The instructor plays a critical role in helping students become self-directed learners and must create a classroom environment in which students “receive systematic instruction in conceptual, strategic, and reflective reasoning in the context of a discipline that will ultimately make them more successful in later investigations”

PBL promotes students’ confidence in their problem- solving skills and strives to make them self-directed learners. These skills can put PBL students at an advantage in future courses and in their careers. While such confidence does not come immediately, it can be fostered by good instruction. Teachers who provide a good learning community in the classroom, with positive teacher-student and student-student relationships, give students a sense of ownership over their learning, develop relevant and meaningful problems and learning methods, and empower students with valuable skills that will enhance students’ motivation to learn and ability to achieve. Research emphasizes the value of PBL for extending student thinking and creativity. Multifaceted problems (those that mimic real-life problems and allow a variety of ways to reach a solution) can also be used in the classroom to reveal student mis- conceptions that traditional tests miss.