Department of Education, Patna University
Course No-C.C8
Unit-2, Learner Centred Instructional Techniques/Methods :
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Problem Solving Method

- Objective : After going through this topic, students will be able to :
  - Understand the concept of Problem Solving Method
  - Analyse the process of Problem Solving Method

- Content
  - Introduction
  - Meaning
  - Objectives
  - Steps
  - Teacher's Role
  - Advantage
  - Disadvantage

Introduction

Problem-solving skills are necessary in all areas of life, and classroom problem solving activities can be a great way to get students prepped and ready to solve real problems in real life scenarios. Whether in school, work or in their social relationships, the ability to critically analyze a problem, map out all its elements and then prepare a workable solution is one of the most valuable skills one can acquire in life.

Educating your students about problem solving skills from an early age in school can be facilitated through classroom problem solving activities. Such endeavors encourage cognitive as well as social development, and can equip students with the tools they'll need to address and solve problems throughout the rest of their lives.

Meaning

A problem is a task for which Problem–solving may be a purely mental difficulty or it may be physical and involve manipulation of data. , the person confronting it wants or needs to find a solution because the person has no readily available procedure for finding the solution. The person must make an attempt to find a solution. Problem solving is the act of defining a problem; determining the cause of the problem; identifying, prioritizing and selecting alternatives for a solution; and implementing a solution.

In a problem solving method, children learn by working on problems. This enables the students to learn new knowledge by facing the problems to be solved. The students are expected to observe, understand, analyze, interpret find solutions, and perform applications that lead to a holistic understanding of the concept. This method develops scientific process skills. This method helps in developing brainstorming approach to learning concepts.

Problem-solving is a process—an ongoing activity in which we take what we know to discover what we don't know. It involves overcoming obstacles by generating hypo-theses, testing those predictions, and arriving at satisfactory solutions.

Problem-solving involves three basic functions:

1. Seeking information

2.Generating new knowledge

3.Making decisions

Objectives of Problem-Solving

- Willingness to try problems and improve their perseverance when solving problems.
- Improve pupils' self-concepts with respect to the abilities to solve problems.
- Make pupils aware of the problem-solving strategies.
- Make pupils aware of the value of approaching problems in a systematic manner.
- Make pupils aware that many problems can be solved in more than one way.
- Improve pupils' abilities to select appropriate solution strategies.
- Improve pupils' abilities to implement solution strategies accurately.
- Improve pupils' abilities to get more correct answers to problems
- The appreciation of the existence of a problems and a desire to solve it
- The accumulation of the facts and data which are pertinent to the problem.
- Logical interpretation of the data supported by adequate valid experience.

Steps of Problem Solving Method

Here is a five-stage model that most students can easily memorize and put into action and which has direct applications to many areas of the curriculum as well as everyday life:

1. **Understand the problem**. It's important that students understand the nature of a problem and its related goals. Encourage students to frame a problem in their own words.
2. **Describe any barriers**. Students need to be aware of any barriers or constraints that may be preventing them from achieving their goal. In short, what is creating the problem? Encouraging students to verbalize these impediments is always an important step.
3. **Identify various solutions**. After the nature and parameters of a problem are understood, students will need to select one or more appropriate strategies to help resolve the problem. Students need to understand that they have many strategies available to them and that no single strategy will work for all problems. Here are some problem-solving possibilities:

- **Create visual images.** Many problem-solvers find it useful to create "mind pictures" of a problem and its potential solutions prior to working on the problem. Mental imaging allows the problem-solvers to map out many dimensions of a problem and "see" it clearly.
- **Guesstimate.** Give students opportunities to engage in some trial-and-error approaches to problem-solving. It should be understood, however, that this is not a singular approach to problem-solving but rather an attempt to gather some preliminary data.

- **Create a table.** A table is an orderly arrangement of data. When students have opportunities to design and create tables of information, they begin to understand that they can group and organize most data relative to a problem.
- **Use manipulatives.** By moving objects around on a table or desk, students can develop patterns and organize elements of a problem into recognizable and visually satisfying components.
- **Work backward.** It's frequently helpful for students to take the data presented at the end of a problem and use a series of computations to arrive at the data presented at the beginning of the problem.
- **Look for a pattern.** Looking for patterns is an important problem-solving strategy because many problems are similar and fall into predictable patterns. A pattern, by definition, is a regular, systematic repetition and may be numerical, visual, or behavioral.
- **Create a systematic list.** Recording information in list form is a process used quite frequently to map out a plan of attack for defining and solving problems. Encourage students to record their ideas in lists to determine regularities, patterns, or similarities between problem elements.

4. **Try out a solution.** When working through a strategy or combination of strategies, it will be important for students to …

    - **Keep accurate and up-to-date records of their thoughts, proceedings, and procedures.** Recording the data collected, the predictions made, and the strategies used is an important part of the problem solving process.
    - **Try to work through a selected strategy or combination of strategies until it becomes evident that it's not working, it needs to be modified, or it is yielding inappropriate data.** As students become more proficient problem-solvers, they should feel comfortable rejecting potential strategies at any time during their quest for solutions.
    - **Monitor with great care the steps undertaken as part of a solution.** Although it might be a natural tendency for students to “rush” through a strategy to arrive at a quick answer, encourage them to carefully assess and monitor their progress.
    - **Feel comfortable putting a problem aside for a period of time and tackling it at a later time.** For example, scientists rarely come up with a solution the first time they approach a problem. Students should also feel comfortable letting a problem rest for a while and returning to it later.

5. **Evaluate the results.** It's vitally important that students have multiple opportunities to assess their own problem-solving skills and the solutions they generate from using those skills. Frequently, students are overly dependent upon teachers to evaluate their performance in the classroom. The process of self-assessment is not easy, however. It involves risk-taking, self-assurance, and a certain level of independence. But it can be effectively promoted by asking students questions such as “How do you feel about your progress so far?” “Are you satisfied with the results you obtained?” and “Why do you believe this is an appropriate response to the problem?”

Teacher's Role in Problem Solving

Teacher's has a very important role in Teaching Learning Process. He or She has the duty to provide proper guideline to the students in the completion of their work. Some important roles are given below:

1. Give suggestions not answers
2. Offer a problem solving heuristic
3. Teach a variety of problem solving strategies
4. Allow time for the students to struggle with the problem
5. Choose problems that require time to think through a solution
6. Provide a variety of problems
7. Allow students time to practice a heuristic and strategies
8. Give similar or the same problem in different ways
9. Ask questions that encourage students to:

    - think divergently
    - explain how they are thinking.
    - to share strategies
    - think of other ways that the same problem could be asked
    - think of real life problems that are or relate to the problem
    - discover different problems that can be solved with the same strategy
    - discover multiple ways to solve the problem
    - reflect or check their solutions
    - reflect and discuss how they imagined a certain strategy might be possible
    - explain why they have confidence in their solutions

10. Provide encouragement and appreciation:

    - appreciate different solutions and strategies
    - encourage students to find multiple solutions to a problem
    - encourage students to take time to solve problems
    - compliment students on good problem solving strategies whether they reach a solution or not
    - make sure students know what a compliment or praise specifically relates to about the problem and problem solving
    - encourage students to keep trying and to learn by correcting mistakes
    - let students know that problem solving is difficult and rewarding
    - share and discuss attitudes and dispositions that are conducive to problem solving

Advantages of Problem Solving Method

1. **Development of Long-Term Knowledge Retention** - Students who participate in PBL activities can improve their abilities to retain and recall information. This is because, while learning about something, open discussion between peers reinforces understanding of subject matter.
2. **Use of Diverse Instruction Types -** Grouping students together for PBL allows them to tackle tangible problems and enjoy team-based learning. You can also provide content such as videos, news articles and more.
3. **Continuous Engagement** - It's not hard to see the potential for engagement, as students collaborate to solve real-world problems that directly affect or heavily interest them.

4. **Development of Transferable Skills** - Using PBL to present tangible contexts and consequences can allow learning to become more profound and durable, helping students apply skills they develop to other real-world scenarios.
5. **Improvement of Teamwork and Interpersonal Skills** - Completing a PBL challenge hinges on interaction and communication, meaning students should also build skills related to teamwork and collaboration.

Disadvantages of Problem Solving Method

1. **Potentially Poorer Performance on Tests** - Because standardized tests typically reward fact-based learning with multiple choice and short answer questions, PBL activities may not effectively prepare students.
2. **Student Unpreparedness** - Many students may not be prepared to participate in a PBL exercise due to immaturity, unfamiliarity with broad questions and lack of prerequisite knowledge.
3. **Teacher Unpreparedness** - You may have to adjust some habits, such as overtly correcting students and teaching to promote the fast recall of facts. Instead, give hints and ask questions to encourage independent thought.
4. **Time-Consuming Assessment -** If you choose to give marks, assessing a student's performance throughout a problem-based learning exercise demands constant monitoring and note-taking.
5. **Varying Degrees of Relevancy and Applicability** - It can be easy for students to divert from the challenge's objectives, possibly missing pertinent information. Running into unanticipated obstacles when solving the problem is another possibility.

Thus the problem solving method is based on the principles of active learning. The student gets totally involved in the activity which helps in enhancing his/her knowledge, understanding and skills in real life situation and ultimately in developing a holistic personality. Since all the activities are related to the real life experiences, each of such activities is meaningful to the student. Therefore, meaningful learning is always associated with this method.

Self evaluation questions:

- Give the brief concept of Problem Solving Method ?
- Explain the different steps of Problem Solving Method and discuss the various roles of teacher.

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