

Teaching Strategies

Educational research has developed a compelling argument for a knowledge-building approach to instruction that reduces the role of the teacher as purveyor of information and enhances the teacher's role as facilitator of learning. Guided instruction and interactive learning allow students to discover concepts and ideas on their own. Concepts learned through this reflective process are usually internalized more deeply and retained with greater meaning than those passively received. Furthermore, when students report and discuss their discoveries with fellow students and the teacher, the learning is enhanced and consolidated.

With these fundamental benefits in mind, *Taking Stock in Your Future Intermediate* has been designed using an array of instructional strategies and provides the teacher with step-by-step instructions for implementation. The complete and innovative lesson plan is designed to maximize student achievement.

Specifically, this *Guide* employs the following categories of proven Instructional Strategies (based on Marzano, R., Pickering, D., & Pollock, J. 2001. *Classroom Instruction that Works, Association for Supervision & Curriculum Development*):

1 Identifying Similarities and Differences

Allows the student to compare, classify information, create metaphors by identifying patterns, and create analogies by recognizing relationships between concepts.

2 Summarizing and Note Taking

Helps students to synthesize information for deeper learning of a concept or skill.

3 Reinforcing Effort and Providing Recognition Through Introductory Activities

Encourages students to understand the link between effort and success in learning and uses recognition for specific accomplishments to motivate higher achievement.

4 Homework and Practice

Provides students with opportunities to deepen their understanding of information presented in the classroom.

5 Graphic Organizers

Supports student retention of concepts through the use of graphics, models, mental pictures, drawings and kinesthetic activity.

6 Co-operative Group Learning

Encourages heterogeneous groupings of students to work collaboratively on a specific task.

Your Notes

7 Setting Objectives and Providing Feedback

Helps students to establish long term and short term goals for learning and provides students with information on their strengths and areas for growth.

8 Generating and Testing Hypotheses

Engages students in the application of knowledge through the generation and explanation of hypotheses.

9 Questions, Cues and Advance Organizers

Activates students' prior knowledge through higher order thinking skills, cues to focus learning on important information, and visual organizers linking prior knowledge to new learning.

Problem Solving

Learning a systematic approach to problem solving will help students engage profitably in complex investigations. Students should be taught how to consider new problems by breaking problem solving down into steps. By following a Problem Solving Model the process can be made much easier. George Polya, one of the world's best problem solvers, developed a model to simplify problem solving. It has 4 stages that are adapted in the following model (*Mathpower 7, McGraw Hill, 1993 p. xi*). Included are some strategies that may help in the problem solving process.

Understand the Problem

- Read the problem to understand the language
- What information or facts am I given?
- Have I done a similar problem before?
- What am I asked to find?



Choose a Strategy

- What strategies do I know?
- Draw a diagram
- Look for a pattern
- Make a table
- Solve a simpler problem
- Use logical thinking



Your Notes

Carry Out the Plan

- Choose the method I will use to carry out the plan
- Give a final statement that gives the solution to the problem

**Look Back**

- Reread the question
- Check all calculations
- Is the answer reasonable?
- Does the answer agree with my estimate?

Note that mathematical strategies fall into the following basic categories:

- Compute or Simplify
- Use a Formula
- Draw a Diagram or Model
- Make a Table, Chart or List
- Estimate, Check and Revise
- Consider a Simpler Case
- Eliminate
- Look for Patterns

Co-operative Group Learning

Many of the teaching strategies in this document are based on co-operative group learning. It is recognized, however, that certain skills and concepts must be demonstrated and taught in traditional ways. *Taking Stock in Your Future Intermediate* reflects this balance among traditional modeling strategies and small group and individual exploration.

The five basic elements of co-operative group learning are (based on Johnson, D.W., Johnson, R.T. and Holubec, E.J. 1990. *Cooperative in the Classroom (rev. ed.)*. Edina, MN: Interaction Book Company):

Individual Accountability

Each student within the group is responsible for learning and contributing to the successful completion of the assigned task.

Your Notes

Face to Face Interaction

Students should be organized in groups of two to six to encourage interaction and dialogue amongst group members. The students' attention is then focussed on the task.

Collaborative Skills

To work in groups effectively, students require social skills. Each co-operative group lesson should include a social skill such as encouraging others to contributing ideas or demonstrating respect for the opinions of others.

Processing

Following a group task, students need to reflect on the success of their academic and social tasks. This process allows groups to work together more effectively over time.

Positive Interdependence

Assigning group members roles such as Recorder, Encourager, Materials Manager or Reporter will help the group complete the task while establishing individual accountability. A clear and specific common goal, as well as the sharing of resources, contribute to positive interdependence.

You will find a list of co-operative group learning strategies suggested for each Activity in the Lesson Plan section of that Activity. The list that follows details a number of popular strategies; it is by no means an exhaustive list.

Co-operative Group Learning Strategies

Pairs Explore

Students work in pairs on an investigation / exploration. Students work together to recognize, describe, extend, and possibly create patterns. Pairs agree on results and prepare a report to share with other classmates.

Pairs Share

Usually following pairs explore, one pair shares and compares their results / strategies with another pair.

Class Share

Students share their thoughts or conclusions with the entire class. This should result in closure to an investigation.

Your Notes

Think-Pair-Share

Students work in pairs. Teacher poses a problem. Each student thinks individually about a response then shares ideas with their partner in an attempt to reach a solution to the problem.

Pairs Coach

In a pair, one student solves a problem while the other observes and coaches. Then, they switch roles.

Pairs Drill

Students work in pairs on a drill exercise. One member does the odd problems, the other the even problems. When problems are completed, students exchange papers and check each other's work.

Three-Step Interview

Students work in fours and separate into two pairs. Within each pair, one member interviews the other about ideas to solve a problem. Then, they reverse roles. The two pairs come together to share the results of the interviews and present their solution/strategies.

Corners

Students are randomly given a question or topic for which each must determine an answer or opinion. The students then proceed to the corner in the classroom that best reflects their answer or opinion. There are normally four or more corners. The students in each corner may then form a group for future investigations, seatwork, or discussions.

Inside-Outside Circle

Students stand in two concentric circles with the inside circle facing out and the outside circle facing in. Each student faces a partner and rotates after each question. Each student may or may not have a clipboard and paper to help them process the answers. This circle is used for review or practise of concepts:

- The teacher may ask the question for all the students to answer then share their results with the partner facing them.
- Different flash cards may be given to each student; the partners answer each of the questions then on cue rotate.

Co-op Co-op

Students work in small teams to investigate a topic for which they have a common interest. The team then shares the product with the class. The learning is seen as a process that flows out of the students' interests.

Your Notes

Numbered Heads

Students work in groups of four with each one being assigned a number from 1 to 4. The teacher poses a problem. The students work together to solve the problem. When the groups appear to be finished, the teacher calls out a number from 1 to 4 and asks that student from each group present the group's solution.

Roundtable

Students work in groups of four. Each group has only 1 pencil and 1 piece of paper. The teacher poses a problem. Each student writes 1 line of the solution then passes the paper and pencil to the next student. This continues until the problem is solved.

Brainstorm

Students work in groups of 3 or 4. Teacher poses a problem to solve. The group generates ideas without passing judgement. The group uses the ideas to generate a solution.

Jigsaw

Students begin in a home group and receive instructions. Each member is given a number. The groups dissolve and the students with the same numbers form expert groups. Each expert group explores and learns a different task. At the completion of the task, the expert groups dissolve and members return to their home groups. Each expert teaches the others about the task they explored.

Turn to Your Partner

Students work in pairs. The teacher asks students to turn to their partners and take turns in posing problems similar to those the teacher has just been explaining.

Co-operative Review

Students work in groups of four. Each group creates a set of problems and passes it to another group to solve. The solutions are then passed back to the original group for assessing.

Roam the Room

All the students roam throughout the room observing the products of other teams. At a given signal, all students return to their teams and report on the information they learned in their roaming.

Your Notes

Carousel Share

One person from each team stays seated by the team's presentation while the rest of the members rotate from presentation to presentation. The team representative presents the team's product with all the other teams as they rotate.

Gallery Tour

Teams' completed products are displayed around the room. Near each product is a piece of paper for other teams to ask questions or write comments. Each team discusses any questions and comments the other teams made about their product and revises the product if necessary.

For further details on co-operative group learning strategies the following resources are helpful:

Where Heart Meets Mind. Barrie, Carol, & Stevahn, L., 1991. Education Connections.

Cooperative Learning Resources for Teachers. Spencer Kagan, 1990.

Our Cooperative Classroom. Johnson, D.W., Johnson, Rr, Bartlett, J.K., Johnson, L.M., 1988. Interaction Book Company.