

Problem Solving: Mathematics and Social Studies

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Effective parallels can be drawn between the intellectual processes inherent in the social inquiry process in social studies and problem solving in mathematics. Both require knowledge of content and specific problem solving processes, and both lead to finding a solution to a problem. Both emphasize an "inquiry" approach which involves students in thinking about possible solutions to problems.

Inquiry may be viewed as a process in which students are actively involved in seeking knowledge. It is a systematic process for thinking about a problem or social issue and consists of a number of intellectual processes such as definition of a problem, gathering data and organizing, analyzing, and evaluating it in terms of relevance to solution of the problem, making inferences and generalizations from the data. All of these skills are applied in inductive and deductive reasoning in the solution of a mathematical problem and in making a decision about an issue in social studies. John Dewey has been credited with taking scientific method of the pure sciences and adapting the process involved to problem solving in the social sciences. Dewey describes the inquiry process in terms of:

active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusion to which it tends.¹

Learning through inquiry is a process of formulating and testing ideas. To this end, a number of inquiry or problem solving models have been developed, but in general, the majority of them seem to apply to both mathematics and social studies:

Problem Solving in Mathematics	Inquiry in Social Studies
Understand the problem.	Identify and focus on the problem.
Plan the solution.	Formulate research questions.
Implement the plan.	Data processing: gather, organize, analyze, evaluate, and synthesize.
Solve the problem.	Make a decision.

¹John Dewey, How We Think: A Restatement of the Relation of Reflective Thinking to the Education Process, revised edition, p. 8. Chicago: Regnery, 1971.

Current educational literature has reemphasized the need to teach children to think more effectively. Efforts have been made to identify subsets of thinking skills inherent in the thinking process, along with some teaching strategies to accomplish this desirable goal. Many of the skills required in learning one subject are transferrable to the learning of another subject, and the teacher has to be alert to opportunities to help students effect the transfer of learning that should take place. Sound pedagogy demands this type of reinforced learning.

Too often the skills in one subject have been taught as discrete entities, with the students being left to discover, often incidentally, the similarity of skill between subjects. There is probably little that is more rewarding for the teacher than to see a student suddenly have a "revelation" in discovering that what he is learning in one subject has some carry-over into another subject. Reinforcement of specific skills, in this case, becomes automatic. Interesting parallels can be made between the skills needed in problem solving in mathematics and those needed in the social inquiry process in social studies.

Problem Solving Process in Mathematics

Social Inquiry Process in Social Studies

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1. **Understand the problem.**
(What is the question?)
Students are to think about the problem before attempting the skills.
- SKILLS:
- identifying key words
 - using manipulatives
 - interpreting pictures
 - restating the problem in your own words
 - asking relevant questions
 - identifying wanted, given, and needed information
 - identifying extraneous information
 - considering alternative interpretations

- Identify and focus on the issue.
- SKILLS:
- interpret and ask
 - coherent in issue
 - vocabulary needed
 - definition of terms
 - interpretation of intent of question
 - paraphrasing to clarify meaning
 - clues to type of data required

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2. **Develop a plan.**
(Strategies for solving the problem are considered.)
- SKILLS:
- collecting and organizing data (charts and graphs)
 - acting it out
 - using manipulatives
 - identifying and applying relationships
 - making diagrams and models
 - using a simpler problem
 - using logic or reason
 - constructing flow charts

- Formulate research questions.**
- SKILLS:
- hypothesize possible solutions
 - formulate research questions to guide information gathering
 - select sources of information

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3. Carry out the plan.
(Carry out the plan developed in Step 2.)

SKILLS:

- collecting and organizing data (charts and graphs)
- acting it out
- using manipulatives
- identifying and applying relationships
- making diagrams and models
- using a simpler problem
- using logic or reason
- constructing flow charts

Data processing.
Gather print, visuals, interviews, and surveys.

ORGANIZE: note-taking, outlining, paraphrasing, tabulating, mapping, charting, and graphing

ANALYZE: categorize, look for relationships, discriminate relevant and irrelevant data - detecting bias, subjectivity, and objectivity

SYNTHESIZE: relate cause and effect, formulate generalizations, and summarize

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4. Solve the problem.
(Encourage students to assess the effectiveness of the solution process.)

SKILLS:

- stating an answer to the problem
- restating the problem with the answer
- determining the reasonableness of the answer
- explaining the answer
- reviewing the solution process
- considering the possibility of other answers
- looking for alternative ways to solve the problem
- making and solving similar problems
- generalizing solutions

Resolve the issue.

SKILLS:

- formulate alternative solutions
- analyze values underlying each alternative
- evaluate alternatives and make decision on the issue

An examination of the above comparison between problem solving in mathematics and the social inquiry process in social studies suggests that teachers be cognizant of the commonality of problem solving skills that exist between two very diverse subjects. Since learning skills are intellectual in nature and competent acquisition of these skills is cumulative, teachers need to explore every opportunity to reinforce their attainment. Students will discover that "thinking" in mathematics is much like "thinking" in social studies and other subjects. Integration of skills from one subject area to another will not be left entirely to chance.

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