

## A Summary of Problem Solving Skills and Techniques

Probably the first [problem solving](#) procedure was introduced by John Dewey, a well known educator since the 1910's and it is the [scientific method](#). Dewey repeatedly stated this structured approach to problem solving could be applied to just about all educational disciplines. It is still considered an approach to be used only in mathematics and science **but** can be used in all disciplines.

**Define the Problem,  
Collect and organize data,  
Develop hypotheses,  
Test (accept or reject) the hypotheses  
Formulate and/or evaluate conclusion(s)**

There has other problem solving procedures developed since Dewey's simple and straight forward five step procedure.

Other procedures are very similar or only refine his basic approach.

**Cognitive skills or traits** which are considered to be **exhibited** by **good problem solvers** are listed below with a brief summary and/or link to a more comprehensive view.

**Comprehensive monitoring:** (knowing when you understanding something or not... )

**Understanding decisions:** (understanding what you are doing and why...)

**Careful Planning:** (develop course of action, consider options, apply without emotions...)

**Estimating task difficulty:** (approximate the difficulty of the task and allow time...)

**Task presentation:** (stay with task, ignore distractions, and maintain focus...)

**[Coping strategies:](#)** (stay calm, manage setbacks, tenacious attitude... )

**Internal cues:** (seek out context or hidden clues when confronted with unique problem... )

**Retracing:** (re-checking terminology, re-reading information, retrace procedures... )

**Noting and correcting:** (using logical approaches not impulsive, double-checking, recognizing inconsistencies or contradictions in procedures or conclusions...)

**Flexible approaches:** (willingness to use unfamiliar approaches, knowing when to use other approaches, random approaches when sensible or plausible, even trial & error approaches when original approach falls flat and does not work.

Links to Problem Solving:

[http://www.managementhelp.org/prsn\\_prd/prob\\_slv.htm#anchor190883](http://www.managementhelp.org/prsn_prd/prob_slv.htm#anchor190883)

<http://standards.nctm.org/document/chapter3/prob.htm>

<http://www.engin.umich.edu/~problemsolving/>

# **The Learning Cycle**

## **Robert Karplus, Jean Piaget, David Ausubel**

### **Engagement Activities**

These activities mentally involve the student with the concept or process to be studied and allows the student to discuss previous knowledge and skills.

During this phase, new materials, concepts, relationships, and skills are introduced with minimal guidance and direction from the instructor.

### **Exploration Activities**

These activities allow students to work together and investigate concepts and processes through hands-on activities.

During this phase, students confront and analyze prior concepts and processes then reaffirm old concepts or construct new concepts.

### **Explanation Activities**

These activities allow students to clarify their understanding of concepts and processes through verbal and written discourse.

During this phase the student must justify their understanding of a concept or skill by one-to-one and/or team discussion.

### **Elaboration Activities**

These activities challenge students to apply and assimilate the concept or skill learned through verbal or written discourse and demonstration.

During this phase the student extends beyond the immediate environment and exhibits a newly acquired knowledge an/or skill.

### **Evaluation Activities**

These activities allow students to asses individually and/or with team members Their newly acquired knowledge and/or skills.

During this phase, the instructor may use various types of authentic assessment, to evaluate the students understanding and skills.

**David Kolb:** The Theory of Experimental Learning [http://iteslj.org/Articles/Kelly-Experiential/Variations of The Learning Cycle:](http://iteslj.org/Articles/Kelly-Experiential/Variations%20of%20The%20Learning%20Cycle/)

[http://changingminds.org/explanations/learning/learning\\_cycle.htm](http://changingminds.org/explanations/learning/learning_cycle.htm)

<http://www.learnnc.org/lp/pages/learningcycle>

<http://www.coe.ilstu.edu/scienceed/lorsbach/257lrcy.htm>