

Inquiring Minds



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*Looking for an inquiry-based
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INQUIRY PHYSICS

meador.org/inquiry.htm

What is inquiry learning?

Inquiry learning is a dynamic approach that involves exploring the world, asking questions, making discoveries, and rigorously testing those discoveries in the search for new understanding. It is stressed in the National Science Education Standards and is a component of the Science section of Oklahoma's Priority Academic Student Skills. But inquiry learning is applicable throughout the curriculum, not just in science education.

Tell me and I forget, show me and I remember, involve me and I understand.

Putting the learner first means changing our educational emphases:

Less emphasis:

Activities that demonstrate and verify subject matter content

Doing few investigations in order to leave time to cover large amounts of content

Management of materials and equipment

Emphasis on individual process skills such as observation or inference

Process skills out of context

Providing answers to questions

Investigations confined to one class period

Concluding inquiries with the result of the activity or experiment

Private communication of student ideas and conclusions to the teacher

More emphasis:

Activities that investigate and analyze questions

Doing more investigations in order to develop understanding, ability, values of inquiry, and knowledge of content

Management of ideas and information

Using multiple process skills – manipulation, cognitive, procedural

Process skills in context

Communicating explanations

Investigations over extended periods of time

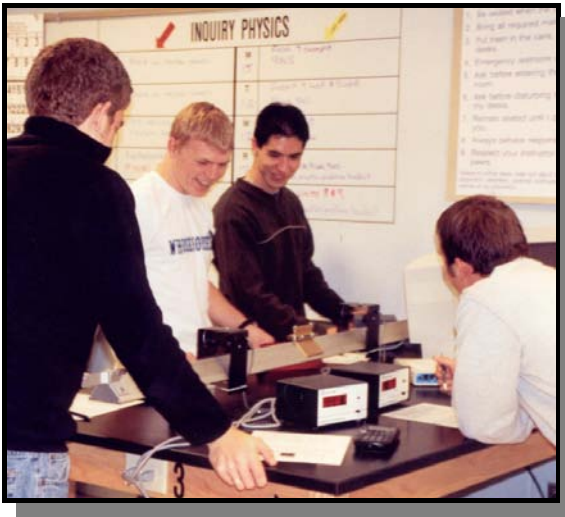
Applying the results of activities or experiments to arguments and explanations

Public communication of student ideas and work to classmates

Paraphrased from *Changing Emphases to Promote Inquiry* in the National Science Education Standards published in 1996 by the National Research Council; <http://www.nap.edu/readingroom/books/nses/html/>

Why use inquiry techniques?

Inquiry approaches improve student motivation and concept retention. Students who actively make observations, collect, analyze, and synthesize information, and draw conclusions are developing useful problem-solving skills. These skills can be applied to future "need to know" situations that students will encounter both at school and at work.



Some information on this page adapted from:

Herron, M.D. (1971). The nature of scientific enquiry. *School Review*, 79(2), 171-212.
See http://edweb.sdsu.edu/wip/four_levels.htm

Moscovici, H. (1998). Shifting from activitymania to inquiry science - what do we (science educators) need to do? In P. Rubba, & J. Rye (Ed.), *Proceedings of the 1998 Annual International Conference of the Association for the Education of Teachers in Science* (pp. 582-590). Pensacola, FL: AETS. (ERIC No. ED421363).
See <http://www.ed.psu.edu/CI/Journals/2000AETS/30moscovici.rtf>

What are the levels of inquiry?

There are different levels of inquiry a teacher can utilize in moving students from the traditional inform-verify-practice approach towards freer forms of inquiry.

Confirmation/Verification aka Inform-Verify-Practice

Students confirm a principle through a prescribed activity when the results are known in advance

Given to the learner:

- problem
- procedure
- solution

Structured Inquiry

Students investigate a teacher-presented question through a prescribed procedure (this is the approach used in Meador's [Inquiry Physics](#))

Given to the learner:

- problem
- procedure

Guided Inquiry

Students investigate a teacher-presented question using student designed/selected procedures

Given to the learner:

- problem

Open Inquiry aka Discovery Learning

Students investigate topic-related questions that are student formulated through student designed/selected procedures

Given to the learner:

- topic

Increasing levels of inquiry require more time, equipment, and teacher flexibility, while providing better student motivation, retention, and learning.

What are the stages in the shift toward inquiry?

One model suggests that teachers go through four stages in various combinations during their teaching careers:

- 1) **textbook** – using the textbook as the main (and often only) material
- 2) **activity mania** – students are busy with disconnected and short hands-on activities that usually remain at the level of fun and do not promote true inquiry; beware of grant ideas that are not connected to the curriculum and do not demand much of the learner
- 3) **imposed inquiries** – the teacher imposes the problem and leads students to the solution
- 4) **personal inquiries** – students generate and conduct their own investigations