

Second Edition

Problem- Based Learning

An Inquiry Approach

John Barell



Contents

Acknowledgments	v
About the Author	vi
Introduction	vii
PART 1: PREPARATION	1
1. An Inquiry Process	3
2. Designing the Invitational Environment	11
3. A Curricular Overview	27
PART 2: APPLICATION	49
4. Teacher-Directed Inquiry	51
5. Teacher-Student Shared Inquiry	83
6. Student-Directed Inquiry	123
7. Multidisciplinary Approaches	136
8. Assessment, Application, and Reflection	152
Resource A	169
References	173
Index	177

JOURNEY OF THOUGHT

This book is titled *Problem Based Learning: An Inquiry Approach* because developing questions about complex, intriguing, and sometimes mysterious experiences or phenomena seems to be a very natural occurrence. When people encounter strange happenings or difficult concepts and ideas, they naturally formulate questions such as, “What is going on? Why is this happening? What does this mean? What will happen in the future?” If they decide to answer these questions, they embark on a journey of thought that may take a few minutes, hours, or years. This book helps teachers create environments wherein they and their students can work with complex, intriguing situations that foster inquiry, research, and the drawing of reasonable conclusions.

STOP AND THINK

At various points in this text, there are places for you, the reader, to stop and reflect on a question. This is an opportunity to generate your own ideas and then compare them with those of others. The purpose of the Stop and Think sections is to elicit a wide variety of ideas and get teachers thinking about how to use inquiry for problem-based learning (PBL).

There is also a What’s My Thinking Now? page at the end of each chapter. This page offers readers an opportunity to reflect on the chapter and jot down any comments or questions they may have—ones they may want to research later.

TRANSFORMATIONAL ELEMENTS

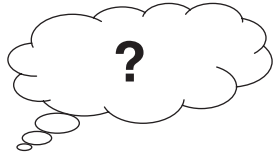
Not all school-based learning experiences can be called transformational; however, the premise of this book is that with students, teachers can design learning opportunities that build on the inquiry process. Inquiry, posing questions, is important for several reasons:

- Inquiry is a natural process, one people engage in from the time they begin to experiment with language
- Thinking begins with problematic situations, ones characterized by doubt, perplexity, and uncertainty
- Thinking through such dilemmas often leads to meaningful discoveries and then more and more questions
- The process is transferable from any one situation to another, across all cultures and ages

Stop and Think



Identify a transformational experience of your own, one that may have begun with a complex situation that invited problem solving or long-range investigation.



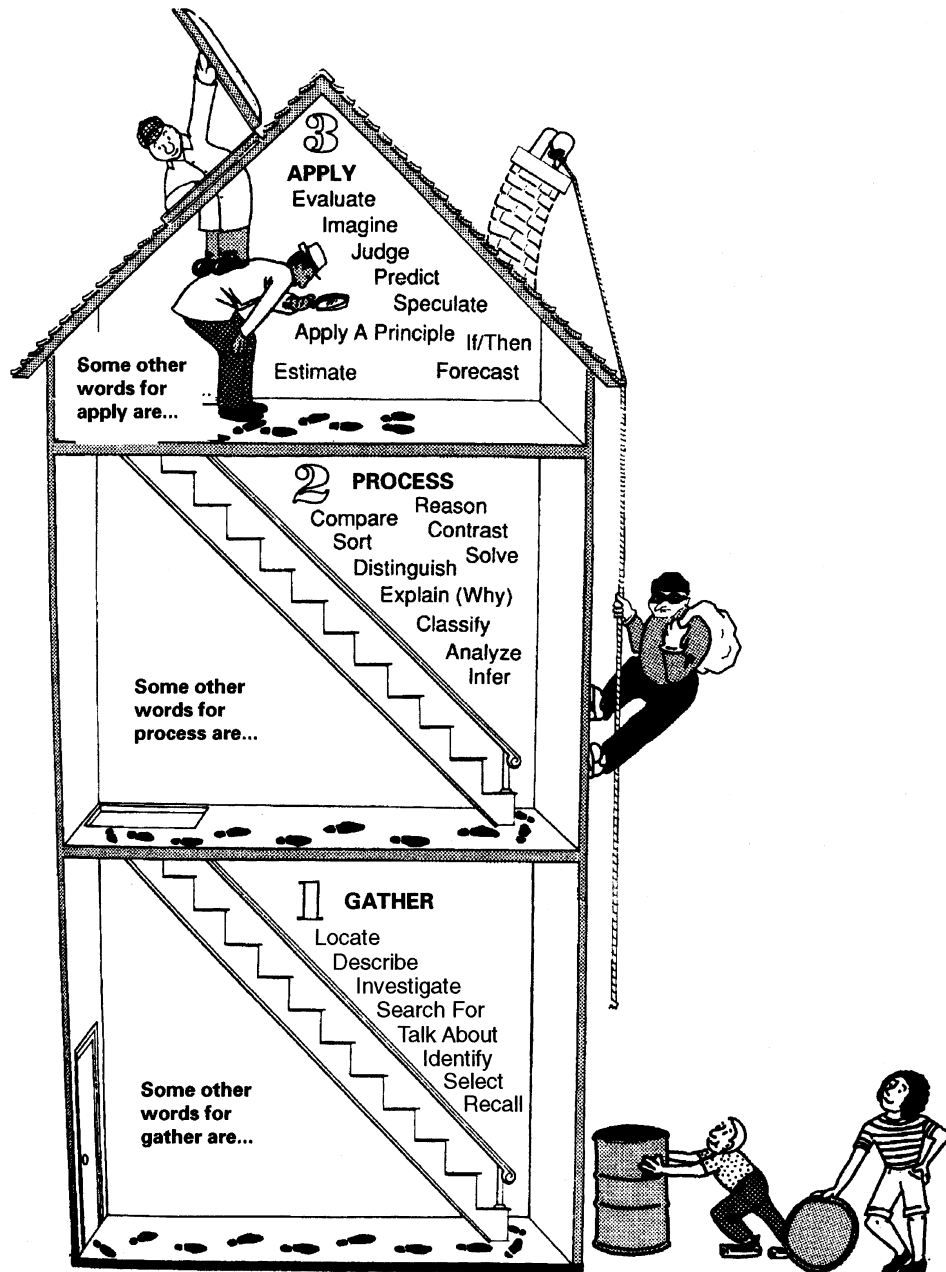
What's My Thinking Now

Reflection

Comments

Questions

Figure 2.3 Three-Story Intellect



SOURCE: From *Problem-Based Learning & Other Curriculum Models for the Multiple Intelligences Classroom*, by Robin Fogarty, 1997.

thought. Such a model is the Three-Story Intellect (see Figure 2.3). This model provides teachers with a way of thinking about how students learn for deep understanding. Students need to gather information through a variety of means. They need to process and apply it to develop a deep understanding and sense of ownership of the knowledge or skill. So much of classroom discourse still seems to focus on only one of the levels of the three-story intellect model.

CRITERIA FOR CULTURAL AND GEOLOGICAL AND GEOGRAPHICAL PROBLEMS

<p>Problem A Criteria</p> <p>Complex 3</p> <p>Robust 4</p> <p>Fascinating 4</p> <p>Researchable 4</p> <p>Social Concerns 1</p> <p>Transferable 2</p>	<p>Problem C Criteria</p> <p>Complex 4</p> <p>Robust 4</p> <p>Fascinating 3</p> <p>Researchable 4</p> <p>Social Concerns 3-4</p> <p>Transferable 2</p>
<p>Problem B Criteria</p> <p>Complex 4</p> <p>Robust 4</p> <p>Fascinating 3</p> <p>Researchable 4</p> <p>Social Concerns 4</p> <p>Transferable 3</p>	<p>Problem D Criteria</p> <p>Complex 4</p> <p>Robust 4</p> <p>Fascinating 3</p> <p>Researchable 3</p> <p>Social Concerns 3-4</p> <p>Transferable 3</p>

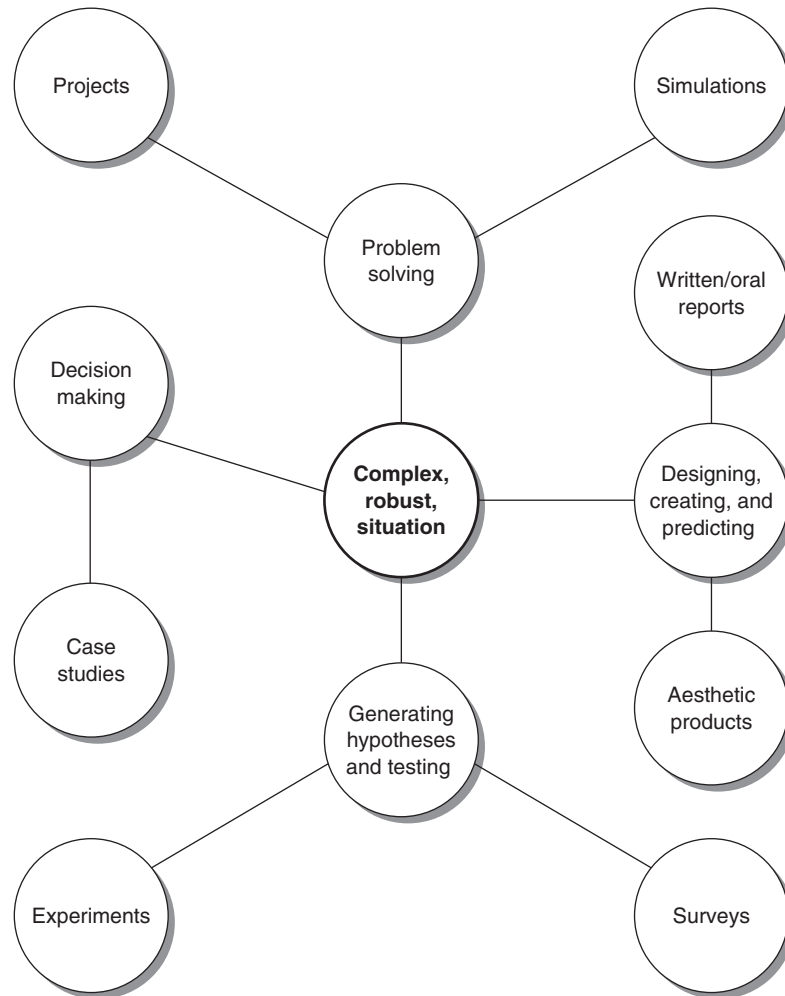
Figure 4.6

Working with the four possible problematic situations, what kinds of intellectual demands is Anne Marie making on students with each of them? What kinds of intellectual, social, physical, and emotional processes might she expect students to experience? The following outlines the intellectual demands Anne Marie makes:

Determine why pictures of the Appalachians, Rocky Mountains, Himalayas, and/or Alps appear different. Here Anne Marie definitely asks students to compare and contrast, looking for similarities and differences and to draw tentative conclusions (a necessary step too often omitted from our having students create Venn diagrams). Then she wants them to engage in causal reasoning, searching for reasons and evidence to support their favored point of view about why the Appalachian Mountains look different from other mountain ranges.

Analyze how life in the region became so harsh and how to make it better. Here again she is searching for causes. This requires a good deal of historical research, gathering relevant information, analyzing it, and drawing conclusions.

Create a fictional family and show how they survive. First, students must know (or find out) about living conditions in the region. Then they must analyze what makes living so harsh (e.g., climate, opportunities for work, education, community planning, farming conditions, etc.). Then

Figure 4.8 Concept Map of Long-Term Strategies

staying there and what they might do to alter their own situation. Here are some suggested experiences that might relate to this objective:

- Examining economic statistics
- Researching (Internet, books, magazines, etc.)
- Learning problem-solving strategies
- Interviewing people for information
- Reading stories about families
- Small group problem posing/resolving
- Viewing videos, CD-ROMs, or other media

One other strategic consideration that might help Anne Marie organize her learning experiences is to divide them up into beginning (initiating), middle (core), and ending (culminating) kinds of activities.

For example, she wants to commence her unit by grabbing students' attention and helping them see how they relate to the content. Making this kind