CHAPTER 1
A CONCEPTION OF AUTHENTIC HUMAN ACHIEVEMENT

THE PROBLEM

Why should we be concerned about "authenticity" in education? Aren't there already enough ideas–such as higher level thinking, creativity, basic and cultural literacy, disciplinary mastery, career skills, and responsible citizenship–that can serve as standards for intellectual quality?

The aim of authentic standards for intellectual quality is not to replace these goals, but to address a serious problem that is neglected even as these goals are ardently pursued.

The problem is that the kind of mastery required for students to earn school credits, grades, and high scores on tests is often considered trivial, contrived, and meaningless–by both students and adults. This absence of meaning breeds low engagement in schoolwork and inhibits transfer of school learning to issues and problems faced outside of school. The problem can be attributed to many sources: a curriculum consisting largely of superficial exposure to hundreds of isolated pieces of knowledge, which is reinforced by teacher training institutions, textbook publishers, testing agencies, and universities; teaching loads and school schedules that exacerbate problems of classroom management, making it difficult for teachers to concentrate on individual students using their minds well; and student isolation from adults in the community beyond school who have made significant achievements.

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In short, schools seem to promote inauthentic kinds of mastery and achievement. In contrast, authentic academic achievement stands for accomplishment that is worthwhile, significant, and meaningful. Consider the kinds of mastery demonstrated by successful adults–scientists, musicians, business entrepreneurs, politicians, craftspeople, attorneys, novelists, physicians, designers. What key characteristics of their work justify calling their accomplishments authentic? And how do these characteristics of "real" accomplishment differ from the work that students complete in school?

This complicated matter involves controversial educational values; it has not received extensive scholarly study; and it beckons for interdisciplinary analysis of the relationship between formal attempts to educate and the ways that human competence is expressed in noneducational settings. The conception proposed here is based on the work of Archbald and Newmann (1988); Berlak, et al. (1992); Raven (1992); Resnick (1987); and Wiggins (1993).

We define authentic academic achievement through three criteria: construction of knowledge, disciplined inquiry, and value beyond school.

Construction of Knowledge

First of all, persons in the diverse fields named above face the primary challenge of constructing or producing, rather than reproducing, meaning or knowledge. They express this knowledge in written and oral discourse (words and symbols in documents and conversation or speeches), by making and repairing things (products such as furniture, buildings, videos, sculpture), and in performances for audiences (musical, dramatic, athletic).

We do not expect children to attain levels of competence comparable to skilled adults, but we do want students to develop in that direction. To progress on this journey, they should set their sights on accomplished expressions of adult knowledge. That is, they should hone their skills through guided practice in producing original conversation and writing, through repairing

and building of physical objects, or through artistic and musical performance. In contrast, the conventional curriculum asks students only to identify the discourse, things and performances that others have produced (for example, by recognizing the difference between verbs and nouns, or between socialism and capitalism; by matching authors with their works; by correctly labeling rocks and body parts). As we emphasize below, student construction of knowledge must be based on understanding of prior knowledge. That is, students must assimilate a great deal of knowledge that others have produced. But the mere reproduction of that knowledge does not constitute authentic academic achievement, because it does not involve interpretation, evaluation, analysis, synthesis, or organization of information that characterizes authentic adult accomplishment.

Disciplined Inquiry

A second defining feature of authentic academic achievement is its reliance on a particular type of cognitive work: disciplined inquiry. Disciplined inquiry consists of three main features: 1) use of a prior knowledge base, 2) striving for in-depth understanding rather than superficial awareness, and 3) expressing conclusions through elaborated communication. In highlighting these features we are not suggesting that young students can be expected to make seminal contributions to the academic disciplines, professions, and arts, but that they are quite capable of engaging in these forms of cognitive work when the work is adapted to students' levels of development.

A broad definition of authentic human accomplishment might not always illustrate disciplined inquiry as suggested by academic study (Gardner, 1983, 1993). For example, feats of wilderness survival that depend largely on ingenuity and courage, forms of athletic prowess, or selfless acts of caring, devotion, and personal sacrifice might all be considered authentic; but they may not illustrate much disciplined inquiry. Since schooling, at a minimum, should promote *academic* study, this conception of human accomplishment is admittedly limited

to achievements that depend on the use of formal knowledge. Formal knowledge itself, of course, encompasses an enormous diversity in the liberal arts, applied professions, and crafts, along with fields of literature, discourse, and practice that may not be recognized as "disciplines" in schools or universities.

From our point of view, a field of expertise that has accumulated a formal knowledge base, and which functions as a community of discourse to advance that knowledge, can be considered a discipline, even though it may not have been institutionally established (e.g., through awarding of advanced degrees). Examples might include stamp collecting, model railroads, specialized computer user groups, or skydiving.

Prior knowledge base. Impressive accomplishments build on prior knowledge that has been accumulated in a field. The knowledge base includes facts, vocabularies, concepts, theories, algorithms, and conventions for the conduct and expression of inquiry itself. The ultimate point of disciplined inquiry is to move beyond former knowledge, through criticism and development of new paradigms. But these advances are themselves stimulated by the foundations of prior knowledge. Most of the cognitive work of school, however, consists of transmitting prior knowledge to students and asking them to accept it as authoritative and to reproduce it in fragmented statements.

In-depth understanding. Disciplined inquiry tries to develop in-depth understanding of a problem, rather than only passing familiarity with or exposure to pieces of knowledge. Prior knowledge is mastered, therefore, not primarily to become literate about a broad survey of topics, but to facilitate complex understanding on discrete problems. In-depth understanding requires more than knowing a lot of details about a topic. Understanding occurs as one looks for, tests, and creates relationships among pieces of knowledge that can illuminate a given problem or issue. In short, in-depth understanding involves construction of knowledge around a reasonably focused topic. In contrast, many of the cognitive tasks of school ask students to show only superficial awareness of a vast number of topics.[1]

Elaborated communication. Scientists, jurists, artists, journalists, designers, engineers, and other accomplished adults working within disciplines rely upon complex forms of communication, both to conduct their work and to express their conclusions. The language they use–verbal, symbolic, and visual–includes qualifications, nuances, elaborations, details, and analogs woven into extended expositions, narratives, explanations, justifications, and dialogue. In contrast, much of the communication demanded in school asks only for brief responses: choosing true or false, selecting from multiple choices, filling in blanks, or writing short sentences (e.g., "Prices increase when demand exceeds supply.").

Value Beyond School

The third distinction between authentic human achievement and conventional school achievement is that authentic achievements have meaning or value apart from documenting the competence of the learner. When adults write letters, news articles, insurance claims, or poems, when they speak a foreign language, when they develop blueprints, when they create a painting or a piece of music or build a stereo cabinet, they try to communicate ideas, to produce a product or to have impact on others beyond the simple demonstration that they are competent. Achievements of this sort have special value, which is missing in tasks contrived only for the purpose of assessing knowledge (such as spelling quizzes, laboratory exercises, or typical final exams). The cry for "relevant," "student-centered" curriculum is, in many cases, simply a less precise expression of this desire that student accomplishment should have value beyond being an indicator of success in school.

Implications

These three criteria–construction of knowledge, through disciplined inquiry, to produce discourse, products and performances that have meaning beyond success in school–can serve as standards of intellectual quality for assessing the authenticity of student performance. All three criteria are

important. Students might confront a complex calculus problem demanding much analytic thought (construction of knowledge and disciplined inquiry). Solving the problem may be challenging, but if its solution has no interest or value beyond proving competence to pass a mathematics course, its authenticity is diminished. Or a student may write a letter to the editor, saying she opposes a newly proposed welfare plan. This activity may meet the criteria of constructing knowledge to produce discourse with value beyond school, but if it shows only shallow understanding of the issues or significant errors, it would be less authentic because of shortcomings in disciplined inquiry.

The conception of authentic achievement is demanding in its insistence on all three standards. In most cases, it would be inappropriate to judge an achievement simply as authentic or inauthentic. Judgments on each criterion are more likely to fall somewhere on a continuum from high to low, rather than at either extreme, and a given achievement could be high on some criteria, but low on others. The ideal to strive for is high fulfillment of all three.

But even if authenticity were accepted as a key indicator of intellectual quality, one would not expect all instruction and assessment activities to meet all three standards all of the time. For example, repetitive practice, retrieving straightforward information, and memory drills may be necessary to build knowledge and skills as foundations for authentic performance, or to prepare for inauthentic tests required for advancement in the current educational system. The point is not to abandon all forms of "inauthentic" work in school, but to keep authentic achievement clearly in view as the valued end.

Why should education aim toward authentic achievement? Responding to the problems of conventional schooling mentioned at the beginning of this chapter, we emphasize two compelling reasons–engagement and transfer. First, participation in authentic tasks is more likely to motivate students to sustain the hard work that learning requires. Because authentic work has value beyond the demonstration of competence in school, and because it permits more comprehensive use of the mind, students will have a greater stake in authentic achievement. Students are more engaged in classrooms that promote authentic achievement (Marks, 1995).

Second, authentic academic challenges are more likely to cultivate capacities for higher order thinking and problem solving useful both to individuals and to the society. The mastery gained in school on authentic work is likely to transfer more readily to life beyond school, and this increases the efficiency of the investment in schooling.

Using this conception of authentic achievement as a foundation for enhancing the intellectual quality of schoolwork, the next three chapters present more specific standards for assessment tasks, instruction, and student performance.

Endnote for Chapter 1

[1]Commitment to depth over coverage entails no necessary narrowing of the curriculum to any particular fields. Diverse fields in the sciences, humanities and arts can still be pursued over the course of a student's education. Regardless of the field or topics studied, the objective here is to concentrate on depth, rather than superficial exposure.

CHAPTER 2
AUTHENTIC ASSESSMENT TASKS

INTRODUCTION

Since "what you test is what you get," we begin with assessment tasks; that is, the assignments teachers use to evaluate student learning. Assessment tasks communicate to students the kind of intellectual work that is valued. For students to attain authentic academic accomplishment, instruction and assessment must aim toward tasks that demand construction of knowledge through disciplined inquiry and that result in discourse, products, and performances that have value or meaning beyond success in school. We asked teachers to send examples of assessment activities that they relied on to make judgments about how well their students were understanding and mastering their subject. Teachers sent a great variety of tasks. They asked students to complete opinion essays, explain solutions to mathematics problems, compile research reports, draw maps and mathematical diagrams, and complete short-answer tests.

We considered only tasks that asked for written work, because, as a minimum, all students should learn to write well in both mathematics and social studies. Tasks calling for nonwritten performance such as oral discourse, the design or building of physical products, and nonverbal visual displays can also provide impressive evidence of construction of knowledge, disciplined inquiry and performance that has value beyond success in school (Armstrong, 1994; Herman, Aschbacher, & Winters, 1992). Several of the standards below might apply with equal force to a broader range of assessment tasks. But our resources and expertise permitted scoring only students' written performance.

Project staff and practicing teachers of mathematics and social studies scored the authenticity of the assessment tasks sent by the teachers. We used seven standards, described and illustrated below. The standards for tasks reflect the three more general standards for authentic human achievement as follows:

Construction of Knowledge
1. Organization of Information
2. Consideration of Alternatives

Disciplined Inquiry
3. Disciplinary Content
4. Disciplinary Process
5. Elaborated Written Communication

Value Beyond School
6. Problem Connected to the World
7. Audience Beyond the School

We present illustrative tasks that scored high on each of these standards for mathematics and social studies. The technical definitions and criteria used to score tasks are given in Appendix B.

STANDARDS AND EXAMPLES

Standard 1. Organization of Information: The task asks students to organize, synthesize, interpret, explain, or evaluate complex information in addressing a concept, problem, or issue.

Mathematics Example for Organization of Information

Fourth- and fifth-grade students were given the following task involving measurement, fractions, and fraction computation:

> We are making a bookcase to hold our new stereo. We need to have 3 shelves. The top shelf must contain 3 compartments; the second shelf, 2 compartments; and the bottom shelf, 1 compartment. We also have

> 6 boards that are 60 inches long, 2.5 feet wide, and 1 inch thick. Draw a diagram of what the shelf will look like when finished. Using fractions, show how you will cut the boards to make compartments.

This task scored high on Organization of Information because it could not be completed successfully unless students organized and interpreted the information presented into a new form. They had to take information on the number of shelves and compartments needed, and the number of boards available with specific dimensions, and put this together in a design that would work mathematically (e.g., the dimensions indicated in their bookshelf could not exceed the length of boards that were given). The teacher's grading and comments on student work showed that she expected students not only to label the different parts of the shelves, but to show that the measurements and fractional parts added correctly.

Social Studies Example for Organization of Information

Eighth-grade students were asked to write a report comparing immigration past and present. Instructions to students included the following:

> Immigration has occurred throughout American history. Identify major groups of people entering this country and indicate when most of them came. What events or conditions motivated these different groups to immigrate to the U.S.? How has immigration been regulated and controlled? How has regulation changed over time? Why is immigration now a major issue in this country? In what ways is the issue the same or different now?

This task scored high on Organization of Information because it required students to synthesize information and make distinctions, comparisons, and generalizations about several aspects of immigration in different historical periods: the key groups, causal conditions, regulatory policy, and relevance to contemporary issues in the United States.

Standard 2. Consideration of Alternatives: The task asks students to consider alternative solutions, strategies, perspectives, or points of view in addressing a concept, problem, or issue.

Mathematics Example for Consideration of Alternatives

For this task, eighth graders were instructed to build a set of polyhedrons, known as the Platonic Solids or regular polyhedrons.[1]

> The simplest Platonic Solid can be assembled out of four congruent equilateral triangles and is called a regular tetrahedron or a regular triangular pyramid. Your job is to build this and all other possible regular polyhedrons.
>
> Make a chart showing which shapes you use, how many faces your polyhedron has, and how many faces meet at each vertex. Also note any attempts or strategies which proved impossible–this will be helpful in answering the next section.
>
> Finally, explain in paragraph form why a limited number of regular polyhedrons are possible to make with each shape. Imagine that you are writing to a seventh grader whose only knowledge of polyhedrons is this set of directions. Think of how you can explain to them the possibilities and limitations. Include drawings and diagrams which might be helpful.

This task scored high on Consideration of Alternatives because it could be completed successfully only if students considered alternative shapes and how these shapes would or would not fit the geometric definition of Platonic polyhedron. To arrive at mathematically accurate conclusions, students had to consider the methods or strategies for building the polyhedrons, explanations for why there are a limited number of possibilities, and they had to choose appropriate phrasing to make their explanations understandable to a younger student.

For example, a child could build a cube by attaching 12 straws, each one the same length as the others. Alternatively, she could first build six squares (one for each face of the cube) and attach the faces

to one another to create the cube. The second strategy would clearly demonstrate that the student had some understanding of how one-dimensional shapes (lines) can be used to create two-dimensional shapes (squares); and how two-dimensional shapes (squares) can be used to create a three-dimensional shape (a cube). To explain how the shapes limit the number of polyhedrons, one kind of explanation would focus on the angles of the faces. Another could focus on whether or not Platonic polyhedrons "fill up" space (similar to whether a two-dimensional shape can cover the plane).

Social Studies Example for Consideration of Alternatives

The following task in eighth-grade history required students to construct a persuasive argument. The task stated:

> You are to play the role of an advisor to President Nixon after his election to office in 1968. As his advisor, you are to make a recommendation about the United States' involvement in Vietnam.
>
> Your paper is to be organized around three main parts:
>
> An introduction that shows an understanding of the Vietnam War up to this point by explaining who is involved in the war and what their objectives are; also in the introduction, you are to state a recommendation in one or two sentences to make the advice clear.
>
> The body of the paper should be written to convince the President to follow your advice by discussing:
>
> (a) the pros of the advice, including statistics, dates, examples and general information to be authoritative;
>
> (b) the cons of the advice, letting the President know that the advisor is aware of how others might disagree. Anticipate one or two recommendations that others might give, and explain why they are not the best advice.
>
> The conclusion makes a final appeal for the recommendation and sells the President on the advice.

This task scored high on Consideration of Alternatives because it explicitly called on students to consider alternative recommendations that the President might receive, such as major escalation of U.S. military action, withdrawal, and working toward international negotiation for peace. In analyzing these alternative courses of action, students would have to demonstrate their understanding of the interests and goals of the contending factions.

Standard 3. Disciplinary Content: The task asks students to show understanding and/or use ideas, theories, or perspectives considered central to an academic or professional discipline.

Mathematics Example of Disciplinary Content

Fifth graders were asked to:

> Draw geometric designs of your own making on a grid.
>
> Write a BASIC program that will replicate these designs.

This task scored high on Disciplinary Content because it required students to understand the relationship between aspects of Cartesian geometry and algorithmic processes in mathematics. For instance, to write a BASIC program that draws a simple shape, like a square, a student would need to decompose the shape (square) into its constituent lines and angles and then write the steps for drawing lines of the same length and making turns of a given angle in BASIC language. The student would have to create a properly ordered algorithm for drawing a square. The program, when it ran, would not draw the original square unless the student knew the relationship between this geometric figure and the algorithm for drawing it.

The teacher's comments on student papers indicated that she also valued students' understanding of recursion, another important mathematical concept. To make sure that their programs worked, students compared their own drawings with the computer printout and then had to apply algorithmic processes to debug their programs. The task provides an example of how different kinds of mathematical content (principles of geometry and algorithmic reasoning) can be related to one another through computer applications.

Social Studies Example of Disciplinary Content

In a high school history course, students were asked to:

> Compare FDR's "Three Rs" of the 1930s with Clinton's "jumpstart" proposal to stimulate economic recovery in the 1990s. Include in your comparisons the extent to which assumptions and "theory" about the economy of FDR's time were similar to, or different from, more recent economic theory.

This task scored high on Disciplinary Content because it required students to show an understanding of the connection between political strategies and economic activity embodied in each of the "Three Rs" (Relief, Recovery, and Reform) during the Great Depression. By asking students to compare and contrast these strategies with President Clinton's proposals for economic recovery, the task required students to connect the historical interventions to recent thinking about economic stability and growth. To do this successfully, students would need to understand the effects of government action and market forces on investment, employment, and earnings.

Standard 4. Disciplinary Process: The task asks students to use methods of inquiry, research, or communication characteristic of an academic or professional discipline.

Mathematics Example of Disciplinary Process

In this task, fifth graders were to explore the relationships between the number of teeth in a gear and the number of turns that another gear, with more or with less teeth, would take if the first gear was given a full turn. This relationship was studied among gears with 40, 24, and 8 teeth taken in pairs. The task ended with the assignment:

> If a 12-tooth gear turns one time, how many times would each of these gears turn: 2-toothed gear; 3-toothed gear; and 4-toothed gear?
>
> Explain how to find the number of turns that a gear will take when connected to another gear.

This task scored high on Disciplinary Process because, in order to complete it, students had to search for a pattern that would relate (a) the number of turns each wheel would take to (b) their relative number of teeth. In order to solve the first problem, students had to generalize the patterns from their exploration to a new situation. And in order to explain their rules, students would have to create conventions for writing about ratios and proportions.

Social Studies Example of Disciplinary Process

Students in a fourth- fifth-grade social studies class were involved in a year-long study of their community that included a unit on urban geography. Working in small groups, students were given the following task:

> First, select one of the neighborhoods marked on the city map. Second, identify its current features by doing an inventory of its buildings, businesses, housing, and public facilities. Also, identify current transportation patterns and traffic flow. From the information made available, identify any special problems this neighborhood has such as dilapidated housing, traffic congestion, or a high crime rate. Third, as a group consider various plans for changing and improving your neighborhood. If there is a special problem, how will you address it? What kinds of businesses, if any, do you want to attract? What kind of housing do you want? Will there be parks and other recreation facilities? What transportation patterns do you want? Do you want to make the block attractive to different groups of people such as senior citizens and young people? After deciding on a plan, draw and label it on the overlay provided with your map. Based on what you know about urban geography, indicate in your narrative one possible plan that you rejected, and say why it was rejected. Indicate how your plan will promote the neighborhood features you want.

This task scored high on Disciplinary Process because it required students to think in some of the same ways as urban planners and geographers. They needed to collect data systematically through observation and recording, use these data as the basis for making generalizations about patterns in human behavior, and make choices about preferred uses of resources and space to fulfill different functions within a community.

Standard 5. Elaborated Written Communication: The task asks students to elaborate on their understanding, explanations, or conclusions through extended writing.

Mathematics Example for Elaborated Written Communication

Eighth graders were told:

> Your group is going to design tiles which can be used to decorate part of the classroom. You can use shapes on the attached Shape Sheet to cut out as many copies of each of the shapes as you need. You may use any other tools you wish (calculators, rulers, glue, string, protractors, compasses, pens, etc.).

Accompanying the assignment was a list of vocabulary words that included regular polygon (a shape whose sides are all the same length and whose corners all have the same "sharpness"), complex polygon (a shape which is not regular), tile (a regular or complex polygon which is used like a puzzle piece to attempt to cover a surface), tessellate (to cover a surface with tiles, all the same shape, so that no tiles overlap and there are no gaps between tiles), good tile (a tile which tessellates), and bad tile (which doesn't tessellate).

The task included two parts. For Part I, children were told to:

> Find out which regular polygons make good tiles (remember: good tiles tessellate). For each good tile you find, cut out enough shapes to cover half a page of paper to show that the tiles tessellate (you can also do this by tracing). For two shapes that are bad tiles, cover half a page showing how they overlap or leave gaps.

> Find a pattern that shows which regular polygons are good tiles. Write an explanation as to why these are good tiles. Based on the pattern that you have found, are there any other regular polygons which make good tiles? Why or why not? Write an explanation which uses information on the papers that you covered with the tiles and the patterns that you looked for.

Part II of the task asked the students to create complex polygons and explore how they could be used to cover a surface. Students were asked to write up their findings and conjectures about this, but without having to provide justifications.

This task scored high on Elaborated Written Communication because in Part I, students were asked to describe and to explain the patterns they had found. The explanations were to include evidence from the drawings (or tracings) and appropriate mathematical terminology.

Social Studies Example for Elaborated Written Communication

A middle school task required students to write a persuasive essay on one of six topics involving the 1992 Presidential election. For example, one of the topics was:

> Write an editorial persuading eligible voters to vote. Give reasons why voting counts. Use examples from history telling why voting is important. If possible, describe what might happen if we lost the right to vote.

The instructions specified that student essays would be evaluated on criteria such as the following:

> Your paper included facts learned in class.
>
> You went beyond what was learned or discussed in class by using a number of different sources of information.
>
> You clearly stated an opinion and supported it with reasons and argument.

This task scored high on Elaborated Written Communication because it called for students to develop their arguments

with reasons and with examples from history to show the importance of voting.

Standard 6. Problem Connected to the World Beyond the Classroom: The task asks students to address a concept, problem, or issue that is similar to one that they have encountered or are likely to encounter in life beyond the classroom.

Mathematics Example of a Problem Connected to the World Beyond the Classroom

High school students were given the following geometry task:

> Design packaging that will hold 576 cans of Campbell's Tomato Soup (net weight, 10 3/4 oz.) or packaging that will hold 144 boxes of Kellogg's Rice Krispies (net weight, 19 oz.). Use and list each individual package's real measurements; create scale drawings of front, top, and side perspectives; show the unfolded boxes/containers in a scale drawing; build a proportional, three-dimensional model.

Finally, students were told to write a short explanation of how they did the project and to do an oral presentation. Based on this activity, students were also to answer the question, "How does space involve geometry?"[2]

This task scored high on Problem Connected to the World Beyond the Classroom because it required students to apply mathematics to design packages for items using mathematical concepts and skills. Packaging items is a real-world problem that students commonly face.

Social Studies Example of a Problem Connected to the World Beyond the Classroom

After studying events surrounding the Rodney King beating case, eighth-grade students were given the following task:

> Write a letter to a student living in South Central Los Angeles conveying your feeling about what happened in that area following the acquittal of police officers in the Rodney King case. Discuss the tension between our natural impulse to strike back at social injustice and the principles of nonviolence.

This task scored high on Problem Connected to the World Beyond the Classroom because it asked students to address a fundamental dilemma in human relations: responding to injustice with anger and physical force versus more "peaceful" strategies. Students are likely to encounter this problem often through mass media and their direct experiences.

Standard 7. Audience Beyond the School: The task asks students to communicate their knowledge, present a product or performance, or take some action for an audience beyond the teacher, classroom, and school building.

Mathematics Example of Audience Beyond the School

Fifth graders were asked to choose their favorite computational operation (addition, subtraction, multiplication, division). They were instructed to:

> Design a "sales brochure" intended to interest students in younger grades in learning that operation. Brochures are to highlight the history of the operation, how the operation works with various kinds of numbers (whole numbers, fractions, decimals, mixed numbers), characteristics or properties of the operation (commutativity, distributivity, if appropriate, its inverse, its relationship to other operations), and other noteworthy and interesting things (how you can use it, how it works with a calculator).

The task scored high on Audience Beyond the School because students were writing mathematics brochures that were shared outside their classroom to interest other students in learning mathematics.

Social Studies Example of Audience Beyond the School

The following task was given to fourth-grade students:

> Write a letter to a state assembly representative or state senator expressing your opinion about what

should be done about threatened eagles along the Mississippi River. Your letter should be persuasive, and it should also do the following:

Communicate knowledge about the subject

Organize ideas into paragraphs

Begin sentences in different ways

Use dialogue to communicate ideas

Use correct letter format

Use correct punctuation and spelling

Ask a peer to read your letter and offer constructive criticism. When you are satisfied with your letter, send it.

This task scored high on Audience Beyond the School because it required students to write and send letters to an elected state representative to urge legislative action on a public problem.

SUMMARY

The authenticity of tasks teachers use to assess student achievement depends on the extent to which they meet seven standards:

- Organization of Information
- Consideration of Alternatives
- Disciplinary Content
- Disciplinary Process
- Elaborated Written Communication
- A Problem Connected to the World Beyond the Classroom
- An Audience Beyond the School

In mathematics, a task that met many of the standards was the task for eighth graders to construct all the Platonic Solids (regular polyhedrons). Students had to organize information and consider alternatives in selecting the shapes, length of edges, number of faces for each solid, and patterns to fill the space. They had to apply mathematical concepts of angle, dimensions, shapes and

faces and the mathematical process of searching for patterns and testing a proof of their solutions. The task scored low on Problem Connected to the World Beyond the Classroom because it bore little resemblance to issues that people encounter beyond school. Although the task asked students to "imagine" they were explaining the material to younger students, they did not actually communicate with an audience beyond their classroom.

None of the social studies tasks presented above scored high on all seven standards, but some scored high on several standards. The task asking students to plan the renewal of an urban neighborhood received high scores on almost all of the standards. Students had to organize information using maps and other data; they had to consider at least one alternative plan; they had to use disciplinary knowledge and processes of urban planners; and they had to write an account that explained how their plan addressed problems and goals for their neighborhood. Students who were to write a position paper that advised President Nixon to take a particular course of action in Vietnam met these same standards. However, neither of these tasks asked students to address their work to an audience outside the classroom.

Endnotes for Chapter 2

[1]A polyhedron is a closed, three-dimensional figure whose edges are straight lines. For instance, a pyramid and a shoe box are polyhedrons. A cylinder–such as a tube or a 50-gallon drum–is not a polyhedron since its only edges are circles. A sphere–like a ball–is not a polyhedron since it has no edges; a complete geodesic, on the other hand, is a polyhedron.

A Platonic or regular polydron is a polyhedron whose edges are all the same length and all of whose faces are the same shape. For instance, a cube is a Platonic polyhedron. A pyramid made of up equilateral triangles is also a Platonic polyhedron.

[2]This task was taken from Coalition of Essential Schools (1992).