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From: Learning to Write/Writing to Learn
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Writing to Learn Across the Curriculum

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How We Can Learn Through Writing

One of the most important curricular developments of the last few years has been the emergence of concern for language, and, particularly, of writing, across the curriculum. Originally spotlighted in England by James Britton and his colleagues (see, for example, the Bullock Report, 1975; and Martin et al., 1976), it has recently become important in this country as well. Simply put it means: *The productive use of language, and especially writing, is a valuable tool for learning for all students in all subjects at all ages.* Writing to learn in social studies or science or industrial arts may not seem to be a vital interest of English teachers, but we hope to show in this chapter why writing across the curriculum *is* important and how English teachers can promote it in their schools.

The premise that writing can be a tool for learning depends on several concepts, one of which is this very broad understanding of writing: that it occurs any time one's mind is engaged in choosing words to be put on paper. It includes note-taking, list-making, writing down observations, and expressing feelings, as well as more traditional activities like writing lab reports, essay test answers, essays or stories. Central to this understanding is the notion of language choice. This excludes copying completely—which Bryant Fillion (1979) and Arthur Applebee (1981) have found occupies a lot of so-called writing time in schools. Writing that involves minimal language choices, such as filling-in-blanks exercises or answering questions with someone else's language—the textbook's or the teacher's—are of limited value in promoting either writing or learning.

Writing to learn depends upon an active rather than a passive approach to learning. It requires that we conceive of both learning and writing as meaning-making processes that involve the learner in actively building connections between what she's learning and what is already known. Research on the composing process has shown that writing is not a simple process of transcribing a predetermined text, but a complex process of discovery.

Writing's capacity to place the learner at the center of her own learning

can and should make writing an important facilitator of learning anything that involves language. Writing that involves language choice requires each writer to find her own words to express whatever is being learned. Such a process may initially serve to reveal more gaps than mastery of a particular subject, but even that can be of immense diagnostic value for teacher and learner alike. And as the process is repeated, real and lasting mastery of the subject—and its technical vocabulary—is achieved.

This last point deserves emphasis. Achieving a rich and versatile vocabulary has always been one of the major byproducts of a genuine education. It's no accident that the verbal part of the SAT (which is, in many respects, a vocabulary test) has consistently been the best predictor of college academic achievement. Like most properties of the language system, a rich vocabulary is the result of productive language use, which includes active and responsive reading and listening as well as writing and talking, and is only partially susceptible to direct instruction. Most teachers know that direct vocabulary teaching has little or no permanent effect—it's the quintessential example of "learning" that vanishes immediately following the quiz—but they keep trying it anyway because they don't know a better method.

Writing to learn, to discover connections, to describe processes, to express emerging understandings, to raise questions and to find answers provides the best single means of making the acquisition of vocabulary an active and lasting process. The vocabulary itself isn't the explicit end of learning; rather, it's the means through which the learning is achieved and expressed. Without finding appropriate technical terms, one cannot explain in writing why Jackson vetoed the Second National Bank Bill, or describe how plants get food, or discuss how meaning is made in a Shakespearean sonnet, or write a recipe for fudge. Used in these ways, words become a natural part of the writer's permanent lexicon rather than being the property of the teacher or the text.

JOHN MAYHER What are the core theoretical ideas in a language across the curriculum program?

ROBERT PARKER The primary goal is not to improve students' talking and writing. The primary goal is to improve students' learning. Language in general and writing in particular are seen as the main instruments of learning. The focus on writing, whether in English or other subjects, is always on how writing might be used more widely, more effectively by students as a learning tool. Yet I'm convinced that if you set as your primary goal using writing as a means of learning, you will also improve students' writing.

Central to the idea of using writing to learn is the understanding that learning is promoted this way only if the writing is perceived as purposeful *by the writer.* If it's used largely for regurgitation, the writer is correct to see it as a purposeless dummy run which requires only minimal involvement and effort. But if the task is to describe what one has personally observed about, say, the behavior of a bird nesting in the student's backyard and if, further, the intended audience isn't only the teacher, then the writing and the learning take on a different character. The learning should promote a personal connection between what was observed and the theoretical lenses through which the observation takes place. The teacher (and the texts) help provide those lenses, but the student must do the observing, make the synthesis, and, most important, do it all by shaping a written report for his classmates.

The report must be personal, as well, since it, too, requires a synthesis between the technical language of science and the personal voice of a student speaking to other students. While it's true that students will eventually need to master science writing if they're going to become professional scientists, there's no need to do so in secondary schools. If they've really mastered the content through personal involvement, it's easy enough to help them later develop the ability to express it in impersonal terms. Requiring impersonal academese too early—we have found some teachers assigning research papers in fourth grade—encourages either copying or what we sometimes think of as verbal shortcircuiting, in which the words go in the eyes and out the pen without ever finding a permanent lodging in the brain.

JOHN MAYHER Why were you so unhappy with the fact that you found so much impersonal writing going on throughout the secondary school years in all subjects in Great Britain?

JAMES BRITTON Abstract and impersonal writing is the appropriate end product for writing in physics, biology, chemistry, social studies, history, and so on. That's the goal we're aiming at. But if you insist on that from the start—limp around in that kind of language until you can walk in it—then the learning process of moving from personal writing to more abstract never happens.

Another counterproductive way of attempting to use writing to learn is to place too much initial stress on correctness. This is particularly important for English teachers to convey to both colleagues and students, since writing can't be an effective tool for learning if writers must worry about spelling and punctuation from the first moment they put pen to paper.

Writing to Learn in Action

A natural kind of writing-to-learn assignment is to write about something we've just read. Although it's true that much of our education has been designed to remove any traces of personality from our writing, along with any confidence in our personal voice, for most of us that voice is there, somewhere, and will be revealed when we're no longer afraid of being censured for sounding like ourselves. The assignment we'd like you to try will require that kind of voice and will be free from any censure.

We ask that you write a brief response to the first section of this chapter. If you're reading this book alone, you'll be writing only to yourself, unless you can enlist a friend to read it; but the point is to clarify, extend, synthesize your understanding of our ideas, not necessarily to communicate them to anyone else. What do we mean by a response? Many forms seem possible:

- A summary of what *you* consider to be the important points.
- An example from your own experience of how some aspect of this works (or doesn't).
- An argument with us about some particular point (or points).
- A letter or note to a fellow teacher briefly giving the most significant points you think *they* would be concerned with.
- Some thoughts about how you might put some of these ideas into practice in your classroom.
- A description of how you're already using writing as a tool for learning in your classroom.
- A comparison of a "traditional" with a "writing-to-learn" method of teaching some concept.
- Some questions you have about something in the section.
- Or any other kind of response that seems useful to you as a means of strengthening, personalizing and extending the learning process that you began when you started to read this chapter.

This kind of response is quite different from the traditional "read the passage and answer the questions" pedagogy. There are some uses in asking readers questions after they've read something, but such questions in texts and on tests too often require more regurgitation than synthesis. As in reading tests, the clever student soon learns to read the questions first and then find the answer. While such behavior is clearly an efficient test-taking strategy, using it all the time makes schooling essentially one long test and has the consequence of limiting what is learned to what is tested. Sensitive teachers have blanched for years at the question, "Will it be on the test?" But we must all recognize that we've carefully taught our students to value test scores, and that in too many schools the continuous testing mode of teaching has reduced learning to expediency.

Part of the value of writing to learn, therefore, may be to bring back a broader and deeper commitment to learning for students and teachers alike. Doing so in the present climate of short-term accountability and back-to-basics may seem impossible, but we're convinced that students do want more out of schooling than they usually get and that contemporary critics of schools are not wrong in suspecting that improvement can be made, however misguided they may be in either diagnosis or prescription.

So write your response and reflect on the experience. Particularly, think about what and how you learned through the process of writing. When you've done so, look at some students using writing as a tool for their own learning.

Learning Logs

One of the most effective ways students can use writing as an aid to learning is to keep a running account of what's going on as they work in a particular course. Such accounts have often been called *content journals* (Fulwiler, 1980), but we prefer the term *learning logs*, which emphasizes the desired focus on keeping track of what and how one is learning. Like journals, these learning logs are written for oneself, but they're also an excellent forum for potential dialogues between students and teachers about where things are or aren't working. If teachers regularly skim each learning log, they can get a useful picture of what each student understands or doesn't understand about the material.

Getting started with learning logs requires explicit directions to students, a clear commitment of time and energy on the teacher's part, and enough discussion about what's happening during the first few weeks to ensure that students really do get with it. The best sets of directions we know of come from a school with a highly effective writing across the curriculum program coordinated by Cindy Rudrud in Tolleson High School, Arizona. Her general set of directions asks students to write in order to:

1. React to class activities—what did you think of a lab, a movie, test, etc. Was it valuable?
2. Describe yourself as a science, math, social studies, etc. student.
3. Explain new concepts and ideas. How does new information fit in with what you already know? (Audience is yourself in this case.)
4. Explain new concepts to another student. Identify various audiences—a younger student, a student who has been absent, for example.
5. Question the significance of what you've learned.
6. Question what you don't understand. Try to get material straight when you're confused.
7. Explain assignments in your own words.
8. Describe what has been said about the subject during class.
9. Explain why assignments aren't done on time.

The list is varied and provides opportunity for introspection as in numbers 2 and 6, commentary on the course or class as in 1 and 10, and communication as in 4 and 7. Obviously some types will fit better with some activities or subjects than with others, but the common point about all of them is that they demand active, personal involvement of *each* student/writer in the processes and content of the course. Each helps forge a personal connection between the learner and the material that will enable the learner to become the master of the process. Too often students sit quietly in class with no idea of what's going on. A learning log, and the possible teacher-student dialogue, in private, can go a long way toward opening up otherwise mysterious subjects.

Another Tolleson teacher, Bonnie Thompson, who teaches chemistry and anthropology, has made effective use of learning logs. These are directions for her chemistry students:

"Think" Writing for Chemistry

- The writing you'll do in your chemistry log will provide a way for you to think about what you're learning, to question what you don't understand, and to integrate new concepts and ideas with what you already know. This writing will be *thinking* on paper; therefore, don't worry about mechanical correctness or spelling. Deal with ideas and questions instead. "Think" writing means:
  1. Summarizing what you've learned.
  2. Integrating new ideas with ones you already understand.
  3. Questioning the significance of what you learn.
  4. Discovering questions about what you know.
  5. Discovering questions about what you don't understand.
- "Think" writing will help you:
  1. Understand new material.
  2. Ask relevant questions.
  3. Make new knowledge part of you.
  4. Retain what you learn.
  5. Improve your ability to write in all subjects.
- When should you write? Write when:
  1. You're confused. Write to discover what specific points you don't understand.
  2. New concepts are introduced in class.
  3. You question the importance of an idea.
  4. You're preparing for a test.
  5. You're relaxed and in the mood to write.
- In the beginning you most likely will have [illegible]

Bonnie Thompson's emphasis on thinking on paper and her de-emphasis on correctness or spelling seem just right here. Although she was prepared for her students' initially having to force themselves to write, her patience and careful preparation of guidelines proved worthwhile. Before turning to some of the Tolleson think-writers, we should emphasize that the essential ingredient for a successful use of learning logs as a basis for student-teacher dialogue is trust between student and teacher. The dialogue between Ms. Thompson and a student named Brigette shows clearly that the necessary trust is operating, as does the frankness of the other entries which follow.

BRIGETTE: It's hard for me to understand how to do this but I'm getting there. I don't understand how to write the equation or how to write out the problem to solve the equation. That's mainly the problem. The test seemed pretty easy, but it looks like I got the answers wrong! Sometimes I feel like getting out of this class. I worry about my grades and it gives me so many headaches.
MS. THOMPSON: Don't—don't give up—even if you don't get a good grade you need the experience and satisfaction of hanging in there.
BRIGETTE: I guess a lot of it's my fault, I should come and ask you for help when I need it. I feel real stupid when I ask questions. Everyone seems so much smarter than me.
MS. THOMPSON: Don't you believe it!
BRIGETTE: It's dumb to feel that way. I know that! But I just do.
MS. THOMPSON: Fight it—your questions are the same ones they have too.
BRIGETTE: Science has always been this way for me. Hard! I don't know why, it just is. If someone explained it to me and told me why this has to be like this then I could understand it.

* * *

From Jim H's learning log

I understand most of the concepts that we've learned but that's not the problem. I often have trouble sifting things through my brain. I often have trouble writing an equation. I have trouble wondering which valence to use. For the most part I do understand most everything but writing the empirical formula. I keep forgetting how to figure out how many *moles* of this or how many moles of that there are. That's one thing I have trouble on.

* * *

From Vincente P's learning log

Mrs. Thompson:
I understand it all, so here's a little story.

Once upon a time, in a land far, far away, there was this compound. One day this compound met another compound and it was love at first sight. So after a short engagement, they bonded. They weren't a balanced equation. A few years later, they had baby elements and after years of bliss, they decomposed.

* * *

From Jim H's learning log

$Mg^{+2}Cl_2 + Ba^0 \longrightarrow Ba^{+2}Cl_2 + Mg^0$

In this reaction the Magnesium is replaced by the Barium because it's more active. The Mg atom gains 2 e^- thus making it neutral. The 2 e^- gained by the Mg atom were lost by the Barium atom, thus making it a positive ion. Cl doesn't do anything in this section it just goes along for the "ride."

The best evidence of the value of keeping a learning log is in seeing them at work as in the examples above. But student perception is also important. Two of Ms. Thompson's students expressed their reactions powerfully:

From Ray O's learning log

Since this has been in effect, I've learned more in a short amount of time than since the start of the year. Everything is starting to come *clearer*.

See, what I used to do is a photo-copy type thing—just remembering what was going to be on the test but I didn't know *why*. I had learned it. Even though I sometimes got good grades or bad I still didn't know what was the purpose of learning—for example, the electrons on the outer shell or inner. I still have a problem doing that, but that was before the journals came in. Since journals have been in effect I'm starting to understand *why* AND that was the main problem. This idea of journals is a brilliant and fascinating idea. I thank those who thought up this idea and you for taking time to listen to us.

* * *

From Bob G's learning log

This journal has got to be the best thing that's hit this chemistry class. For once the teacher has direct communication with every member of the class. No matter how shy the student is they can get their lack of understanding across to the teacher. Some students are really embarrassed to raise their hand to ask a question in class. These journals act as a "hot line" to and from the teacher. I feel this journal has helped me

and everyone that I know of in this class. The only thing wrong is, we should have started these on the very first day of school!! In every class!! Thank you very much for all the help this journal has been to me.

Not every teacher or every student will have such a positive experience with learning logs. But "think" writing can work as a tool for learning, and if more teachers will attempt it, more students will have an opportunity to understand *why* and to explore and strengthen their own processes of "sifting things through [their] brain."

The Place of Writing in the School Environment

What we must help teachers in other content areas see is that we're not asking them to become teachers of writing. They will, in fact, be helping their students learn to write because the only way we learn to write is by writing, but they must be encouraged to see writing as a *means* of achieving *their* objectives, not as an end in itself. The important thing for them and their students must be what is to be learned in a particular discipline. They shouldn't think of writing as yet another curricular burden imposed on them because English teachers are trying to shirk it.

We're not denying our mandate for writing instruction. Rather, we're recognizing the diversity of the kinds of writing which will be demanded of students in the real world and in academia. Few English teachers have the technical knowledge to guide students in learning to write science lab reports, electronics technical manuals, analyses of the causes of the Civil War, or guidelines for proper nutrition. Since writing well in a variety of modes is one of the most complex of human achievements, students need practice and help in all areas of the curriculum to be able to develop their writing competencies. Furthermore, some types of writing and learning are uniquely the province of English teachers. Teachers who are interested in having their students master their subjects in a way that makes them a permanent part of their storehouse of knowledge and skill will find writing-to-learn a valuable resource.

JAMES BRITTON It's more difficult to convince teachers that writing is a learning process than it is to convince them that talk is, because so often teachers use writing as a way of testing. They use it to find out what students already know, rather than as a way of encouraging them to find out. The process of making the material their own—the process of writing—is demonstrably a process of learning.

When we're looking for the appropriate place to use writing in the school environment we must first look at those areas of the curriculum that include a language component. In physical education, for example, this would be that part of the course where rules of a game are explained or a player's responsibilities detailed. In mathematics, the language component might be defined as the non-numerical part of learning math; that is, in solving and writing word problems, in writing out the steps one goes through to solve an equation, and, finally, in those areas where applications of math concepts to real world situations are taught. In industrial arts one might point out that writing instructions for machine operation, compiling a list of building materials, or displaying one's work with a description of how and why it was built all comprise the language component for such a course.

Finding the language component in each discipline is the key to convincing our colleagues that writing might be one way in which their students will be better able to learn these subjects. We don't want to rob students (and teachers) of the time for content, as such. In our experience, it's been fruitless to try to convince physical education teachers that writing in volley ball is worthwhile, unless we can show them that we're not replacing the actual physical activity with something as academic as writing. That's where the "language component" notion becomes so essential. When we've gotten teachers to concentrate on the language of their disciplines, we've been much more successful in getting them to accept using writing as a way for their students to learn.

Content area teachers argue that they're responsible for covering a certain amount of material and that adding writing to their curriculum will make coverage even less likely. Some of this coverage mania is tied to externally developed achievement tests, and until we can do something about these, crammed curriculums will continue to be a problem for all of us. But it's also tied up with standards for promotion from one grade to the next. These reside in a sequential model of learning which assumes that students have mastered, for example, the principles of simple computation in Grade X which will be the basis for learning algebraic concepts in Grade Y. This would be fine if it really happened. The problem is that it often doesn't.

When confronted with teachers who use the coverage issue to defend their stand against using writing, we've asked them if they believe their students are, if fact, learning the content of their courses. Usually the answer is "No," or "Not all of them are." These honest teachers admit that even though they're covering the required material, they know that some students are still lost in Chapter 2, although the rest of the class has moved on to Chapter 8. Asking this question is the best way we have found to break down the "coverage barrier." If students aren't learning, why race through all the required material? There's no good answer, which helps bring the discussion back to learning and away from "covering."

Once the discussion returns to learning, writing can be viewed more

appropriately as one tool for that learning. Some of the best ways we know of using writing in the content areas are directly related to learning content. Take a math example. Writing summaries of chapters, writing up questions in response to new material, rewriting the steps in solving a problem to reveal where one's thinking goes awry, writing one-sentence summaries of a classroom discussion—all are ways of including writing in math.

Through summarization, explication, or formulation of questions, this writing is geared to discovering what students have learned, how much they've understood of what we've taught them and, most importantly, what we need to teach again. A lot of time is wasted in school in reteaching concepts that were supposed to have been learned somewhere else (often in a lower grade) or, in fact, have been learned. Writing can be a way of revealing both of these factors: we can help students learn better and retain knowledge better if they write about it; and a real benefit for us as teachers is that through students writing about something we can find out what they know and don't know.

Another reason content area teachers cite for not wanting to include writing in their classrooms is that they're not qualified to teach it. What they usually mean is that they've not been trained to edit students' work or don't have the expertise to correct spelling, punctuation, or other surface features. And they're right about this. That's why it's so important to make sure they understand that no one expects them to be writing teachers, but rather to provide a better way for their students to learn what they're teaching. We aren't asking them to edit their students' work, but to view writing as a genuine communicative activity, which means we do want them to demand clarity in students' writing.

Take history teachers as an example. History teachers, in general, believe they do require a fair amount of writing in their classes; they give essay tests and assign term papers. A widespread gripe, however, is that their students don't often write clear, full essay answers. The common response to this, we're told, is to accept these "short-circuited" answers because they are decipherable; the implicit connections can be figured out. Furthermore, content area teachers seem to believe that it's the English teacher's job to teach students how to write essay answers. We don't believe this. It isn't reasonable to expect that English teachers have the expertise in science, history or economics necessary to teach students what a well-written essay answer would be in these subjects. The more appropriate place for teaching students how to write essay test answers would be in the content areas themselves. Teachers across the curriculum would be wise to share both good and bad answers with their students, to discuss ways of writing these answers, and how to organize the limited time of an essay test to their best advantage so that the answers produced are clear and complete.

We suggest that teachers no longer accept incomplete or unclear answers;

that they demand clear and complete writing from their students. If students aren't given time to edit—and essay tests usually have tight time limits—they can't be expected to do it. On the other hand, we can insist on clarity. For teachers to use writing as a learning tool they must be able to ascertain from the writing what learning has or hasn't gone on. If the writing isn't clear, learning probably didn't happen. If learning did occur, yet the writing isn't clear, teachers still can't be sure. The two are so tied together that it seems ludicrous to demand one without the other. The final point is that content area teachers have all the expertise necessary to determine clear from unclear writing in their disciplines. They're qualified to require clarity and to teach it.

The third major reason our colleagues don't want to have students write more is usually unstated but nonetheless real: a genuine fear that they may be overwhelmed by an unending flow of student papers. It's true that reading student papers takes more time than scoring a multiple choice test, but many types of student writing (like the learning logs and others mentioned earlier) don't require extensive teacher feedback. And most of the techniques recommended for helping English teachers deal with the paper load can be adapted for use in other areas as well.

JAMES BRITTON What we mean by language across the curriculum is getting teachers who are teaching history and biology and social studies and so on to think more about the role of language in their lessons. In history, we learn to get historical perspectives on the world we live in; in geography and science, we get an organization of our experiences of the environment in different sorts of ways. These are all concerned with organizing the objective aspects of our experience. We have to show them that this isn't basically a concern for language. It's a concern for the quality of learning in all subjects. The quality of learning in all subjects might well benefit if teachers took more into account the actual talking and writing processes as learning processes.

If there's a message for teachers in general from this idea of language across the curriculum it's this: learning involves ability to put an idea into your own words. Rote learning, of course, doesn't. Rote learning means you can get high marks or give back what the teacher has given you whether you understand it or not. Credit is given for verbal expressions that don't necessarily involve understanding. Teachers are using writing to test whether a student has learned something rather than using it as a means of hastening that learning.

Writing Assignments Across the Curriculum

One of the most effective ways of helping teachers in other disciplines become convinced of the potentials of writing to learn is to get them to participate in the three-step process sketched below. The goal is to get other teachers to consider the value of writing as a means of learning content and skills that *they* define. Before or during the process there should be some discussion of the kinds of issues we've been addressing here.

As a first step, ask your colleagues to:

> *Define a learning objective in your discipline which is appropriate for your students.*

It's true that not all learning is facilitated by writing, and so you might be wise to concede this in advance and ask them not to try to deliberately choose one that won't work. The goal is to think of broader and more original types of uses of writing to learn. The objective itself must be genuine.

After discussing the objectives (and trying to be sure they are objectives rather than activities, a confusion we've frequently encountered when we've done this), the next step is to ask the teachers to:

> *Frame a writing task or assignment which would help students achieve the specified objective.*

The focus at this stage should be on *learning,* not writing. Effective assignments will require that both the student purpose and the intended audience are explicitly defined.

Before teachers do the first two steps, provide them with an example or two so that everyone is clear about what is intended and required. One we've used with some success is giving directions or instructions for how to get somewhere or do something. Such assignments can reveal how students understand a process in a specific subject area, which can range from how to make lasagna to how to solve quadratic equations. One form that the writing can take is a how-to instruction to be written for someone who doesn't yet know how. This assignment can take a variety of forms from writing the rules of a game, recipes, instructions for how to operate a machine, writing directions for doing laboratory experiments, or even how to write a term paper. Such assignments, labeled "consequential tasks" by Scardamalia, Bereiter and Fillion (1981), have a built-in sense of audience—someone who doesn't know how to do whatever it is—and purpose—the audience's need to know how. And they have a built-in check on whether or not they've been successful: someone can try to follow the directions and the writer can find out immediately whether they've been clear and complete by observing the efforts of the person who's following them.

They also have a built-in organizational structure, that of a step-by-step chronology. This is a great advantage for the inexperienced writer. There are ordering decisions to be made; the directions must specify that the frammis holder is assembled before the frammis is put into it and so on, but the major decisions involved in this type of writing and thinking are those that concentrate on being sufficiently sensitive to what the reader does and does not need to know.

These examples of consequential writing assignments lead to the third stage in this process, asking teachers to define:

> *What criteria would you use to determine whether or not the learning had been accomplished?*

Several ideas intersect here. Most important is that stress is on the learning, not the writing. A good related question to ask is: How do the learning criteria relate to criteria for evaluating the writing? The conclusion should be that the criteria for evaluating the writing are *means* criteria while the learning evaluation deals with the desired *end.*

To illustrate this we've chosen another example which demonstrates a very different type of writing, but one which can still be used in writing-to-learn. The type of writing we have in mind is a story or narrative. The objective is from social studies: *to help students understand the interactive roles of geography and culture.* This is pretty highfalutin educationese, but we wanted it abstract so that it would be more adaptable to different age levels. A good objective would need to be more sensitive to the particular students involved. (This activity was designed for use in Arizona, but it could be adapted in various ways for other areas of the country.) The kind of writing we had in mind was a *what-if* story, or more specifically, the following:

> Imagine that you were one of the early British settlers in North America. You'd sailed from England in the late 17th century and had been part of a group determined to found a new colony farther inland than the first ones which had been established along the coast.
>
> For the purposes of this assignment, however, you're to imagine what is now the United States as though it had been reversed so that the West Coast is nearest to Europe. The colony our group hopes to found, therefore, is to be located in what is now Arizona.
>
> Your task is to write an eyewitness account of some aspect of the process of setting up such a settlement. You can concentrate on any part of the situation you would like to (i.e., travel difficulties, climate, encounters with the Native Americans, agriculture, the economy, or whatever), but remember you're trying to write a story which will be both interesting to your classmates and as true as possible to the situation such a group would have found if the geography of North America was so rearranged.

This assignment may not be everybody's idea of fun, but it does have many of the characteristics essential to a writing-to-learn assignment:

1. It requires imaginative thinking.
2. It stimulates and provides a reason for the acquisition of new knowledge.
3. It builds on the knowledge and experiences the students already have (in this case, of the climate, flora and fauna, and geography of Arizona).
4. It provides an accessible and enjoyable way of synthesizing old and new knowledge.
5. It provides a natural audience for the written work, which includes but isn't limited to the teacher.
6. It has clearly defined evaluation criteria for both the learning—in this case, the relation between the facts as presented in the story with what is known about *both* the characteristics of the 17th century British settlers and the conditions they would have found in 17th century Arizona—and the writing: is the story enjoyable to read, clear in its organization, and expressive of its point or message?

This last point about criteria relates directly to the evaluation/paper-grading problem. Teachers in other fields, as we've said earlier, will be reluctant to create a mountain of papers to read and grade. This isn't the place to suggest how to reduce that burden, but we hope it's clear that many writing-to-learn assignments don't require significant teacher time to evaluate. The consequential nature of writing directions, for example, can mean that the evaluation amounts to the student's observing how well they can be followed. The varied types of preliminary writing required for successful completion of the British settler story, including notes and early drafts, and the fact that the primary and most significant responses to the story should be from the class, will ensure that the teacher's task is manageable.

The primary value of writing-to-learn should be for the student. Through writing-to-learn, students can develop the capacity to evaluate whether or not they've learned the material. By placing them at the center of their own learning, we are potentially reducing their dependence upon us for validation of their worth as students. Much valuable writing-to-learn takes place in notes and logs and journal entries whose sole audience is the writer and whose sole purpose is to help her discover meaning and privately evaluate her progress.

If we're to be in the business of education rather than that of schooling, one of our long-range goals must be to help students become life-long learners. Developing their ability to use writing-to-learn and their confidence and enjoyment in the process and its results should then be one of the highest educational priorities. Learning is the quintessential human activity. Language is the most powerful learning tool we have. All students have a right to discover—or, perhaps, rediscover—the joys of learning, and we should all recognize that writing-to-learn is one of the best means of helping them to do so.

ROBERT PARKER There are a series of questions I think teachers across subjects could ask themselves about the kinds of assignments they give to their students.

1. Are there opportunities for students to be involved in the formulation of writing assignments?
2. Does the specific writing assignment encourage students to connect what they already know with the new material, the new information, the ideas which they're being presented with in a particular subject?
3. Does the assignment encourage students to reconstruct the new knowledge, the knowledge they're supposed to be learning? Does it encourage them to use this knowledge in some way?
4. Does the writing assignment represent, or is it located in, a genuine communication situation? Are students writing, at least at times, to truly communicate something to someone else, rather than being asked to write something consistently for an audience that knows the answers better than they do?

What we have said thus far can be applied throughout the curriculum and across grade levels. In the following sub-sections we look more closely at specific writing assignments in math and science, the arts, and social studies. The purpose of including these assignments is to provide a focus for discussion of better writing assignments with teachers in all areas of the curriculum. Each of them should provoke thought and increase awareness of the possible use of writing as a tool for learning in all subjects.

In discussing these assignments and the whole idea of writing across the curriculum with your colleagues, you might raise the following questions as a point of departure for developing additional assignments.

1. Who is the audience?
2. What's the purpose of this writing from the students' point of view?
3. To what degree is the student making language choices?
4. How do you plan to evaluate the learning?
5. Sequencing: What was necessary to prepare students for the writing and where do they go from here?

Writing Assignments in Math and Science

Math. The objective of this math assignment is to understand the Pythagorean theorem in geometry. It's loosely based on the television series,

"You Are There."

> Walter Cronkite has been given the assignment to report to the world the startling discovery of the Greek mathematician Pythagoras that the square of the hypotenuse of a right triangle equals the sum of the square of the other two sides.
>
> Write a transcript of the interview between Cronkite and Pythagoras which explains this discovery to a world which has never heard it before.

Such an assignment, coming after the theorem had been introduced to the class, would disclose whether or not students understood the theorem, had not just memorized the formula. In order for them to prove they understand it, they would have to be able to write an interview which detailed not only the appropriate steps for computing the theorem, but the reasons for the steps as well. The general audience are those people who have never heard of the theorem, but a better audience might be fellow students in the class who would have to solve a problem based on the process described in the interview. Thus, an evaluation check is built into the assignment. Because this theorem is a building block upon which more sophisticated math concepts will be erected, if the students don't show an understanding of it, they'll probably have a difficult time moving on.

Math at any level provides the best built-in evaluations we know of. When we ask students to write their own word problems, for example, we suggest that they work in groups of three. One person writes the problem; another solves it; and the third evaluates what happened: Could the second student solve it? If not, why? Was it because the problem was written poorly—concepts left out or inappropriate sequences of facts given—or was it because the second student doesn't understand how to solve the problem? This evaluation could be written up. The students then change roles so that each of them gets a chance to experience all facets of the writing. Later they will be prepared to challenge other groups with a problem they've created.

Science. The objective of this assignment, "Mr. Wizard Revisited," is to get students to distinguish among the various states of matter. It presupposes that younger students are available so that the older ones may use them as audience.

> Suppose you've been selected to be a guest speaker at "Metropolis Elementary School." You'll be required to introduce the subject of states of matter to a group of fifth graders by giving them directions for performing an experiment. Keeping your audience in mind, write a draft of the talk. Once your talk has been completed the fifth graders will attempt the experiment. (For example, having them melt a piece of ice, heat the liquid that results and observe what happens.)

The study of science demands a great deal of observation. To understand what one observes and to apply the theory to an experiment, students must be able to express in their own words what they thought was going on. Having students produce an experiment based on this presumed knowledge and understanding provides another built-in evaluation: Can the experiment be produced accurately based on the talk—on the students' knowledge of theory and understanding of the various states of matter?

Writing and Learning in the Arts

Language Arts We're including as part of the arts the language arts curriculum. The first assignment is to be used in a reading/literature class. The object of this assignment is to have students understand the role of prediction in the reading process.

> Here's the first paragraph of a short story. After you've read it, think about what might happen next, and write the rest of the story. (Be prepared to share your completed stories with your classmates.)

The teacher would then have students share their stories with each other before reading them the rest of the original version. The discussion might raise the following questions: How did student "predictions" match the outcome of the original story? What role does the language of the text play in being able to predict accurately? Why were some of the students able to predict better than others? Which story (a student's or the author's) does the class prefer and why?

Although the object is to help students learn how to predict and to understand the importance of prediction in the reading process, this is never made explicit. As far as they're concerned, their assignment was to come up with a story—one that would be as good as (maybe even better than) the author's—which they were to share with their classmates. The assignment challenges the students to a sort of duel with the author, where the student gets the chance to participate in the author's writing game. We don't think there's any way to fail here: whether the students match the author's story or create their own, they're still operating as if they (the author and student) are equals. We've often heard students say they could write a better story than this or that author they've read, and this assignment gives them the chance.

Art The following writing assignment was done with two high school freshman art classes in Tucson. The class had been drawing portraits, and the teacher was having some problems getting her students to understand how personality, or inner qualities, could be expressed through portraiture. When she asked us to teach her class, we attempted to solve the problem by showing the relationship between a "written portrait" and a "drawn portrait." Our objec-

tive was to show how words, like particular shadings or lines or emphases on a particular physical characteristic, can expose some inner quality of personality.

Teachers should first read several examples of "written portraits." We chose the Santa Claus description from "The Night Before Christmas" as one of our selections. This was easily recognizable—the students knew immediately who was being described, which gave them confidence to try others. Discussion of who this person might be and why would be helpful. Also, trying to get students to talk about the qualities that were implicit in the description would be necessary so they could become accustomed to how the writer achieves this. Then they, as artists, might be able to reproduce it in their own work.

Students were asked to write out their own descriptions of someone they knew well, or someone they liked, or someone famous—real or fictional. They were paired up and exchanged their written descriptions. Each was to draw the person from their partner's description.

Although there was mixed success in the final drawings—some were very good, others not—the students were challenged and learned a great deal. When their partners were unable to reproduce their written personalities accurately, the students realized it was in part their own lack of skill in expressing in words what they knew to be the person's true qualities. They understood that portrait drawing involves more than a simple line-for-line reproduction of facial characteristics. Even though writing wasn't the goal, the students were deeply involved in the writing part of this assignment and, even more important, actually saw the value in precise word choice and the power words can have in a subject like art.

Writing in Social Studies

We've used this assignment in in-service workshops for two reasons: 1) to get teachers to do some writing of their own; and 2) since this assignment is best done in groups, to familiarize teachers with group writing dynamics. One of the advantages of this assignment has to do with its writing roles: students adopt a character from the cast list and write from that character's point of view. For some reason, writing from a personality other than our own seems to have a loosening effect on writers. Because you're someone else, you don't feel as threatened as you would if you were writing in your own voice. Students have an easier time getting into the language of the period and the tone of the character they've chosen. Some roles required students to write a persuasive or argumentative piece, yet they were never told to write in a particular rhetorical form. It came naturally out of their chosen role. Again, this natural inclination caused less fear in students than if they were told to write a persuasive essay. Our ultimate goal for improving student writing is to get them to be comfortable with their own voices and confident that they have something worthwhile to say, but this assignment can be used early on and might be thought of as a way of enhancing fluency.

The time: June, 1776. The place: Philadelphia. The Second Continental Congress has met to discuss and decide on the Question of Independence, or as John Adams called it, "independency."

The Cast: This could vary depending on the focus the teacher wishes to give it. But you will need as many varying points of view as possible, i.e., a pro-slavery, an anti-slavery, a pro-independence, or an anti-independence. *Delegates:* Brief biographical sketches and points of view for each cast member should be included here.

John Adams
John Dickinson
Ben Franklin
Charles Carroll

Observer/Reporters: Same biographical sketches here.

Thomas Paine
Marquis de Lafayette
General Benedict Arnold
Abigail Adams

A draft of a Declaration written by Thomas Jefferson of Virginia has been circulated among the delegates for their consideration. (The teacher would hand out whatever Declaration paragraphs were pertinent. We used the two opening paragraphs of the Declaration; the paragraph dealing with the slave issue, which was eventually excluded; and the concluding paragraph.)

Your task is to assume the persona of one of the cast (each group, if there are enough students to make more than one, should divide this up), and write a brief position paper/report/argument on your own behalf. You may choose one of the following audiences to address: (Depending on the cast you've chosen, these audiences might change. The point here is to provide enough diversity of audience and to vary the types of forms possible so that students get a chance to experiment, and not everyone uses the letter-writing category.)

	Fellow Delegate	*Family Member*	*General Public*	*Government Official*
J. Adams	X	X		
J. Dickinson	X		X	
B. Franklin	X		X	
C. Carroll	X	X		
T. Paine			X	
Lafayette			French Public	French Court
B. Arnold				British Army
A. Adams			X	George Washington

Write a statement expressing the position you've taken in a way that's appropriate to your chosen audience and consistent with your character and his/her private voice.

This assignment works best at the end of a unit or semester. Students will need background information about the topic which will require them doing additional research. Often we don't give students enough information or directions for an assignment. One of the things we've learned from using writing across the curriculum is that teachers must be clearer about what they want done and how, if they're to help students improve. One additional remark about this assignment as it pertains to social studies: students have a hard enough time connecting to a year ago; it's far more difficult to reach back with them to 1776 when we're trying to get them to understand their history. By involving them in this kind of writing assignment, where they *become* the people they're studying, students seem to have an easier time—and a more successful experience with history—than they would if we were to ask them in an essay exam to list the causes of the Civil War.

This kind of assignment also lends itself quite well to oral role playing, a valuable language development activity in its own right. When students get involved with using someone else's voice and persona, they can stretch their linguistic resources without fear of ridicule. Furthermore, and perhaps even more important, either oral or written role-playing activities provide for incidental learning about, say, the qualities of John Adams' personality or his relations with his peers, which provides a human context for understanding the events in which he participated. The not-so-secret secret, once again, is to enable the learner to make a personal connection between what she knows and what she is finding out. Building such language bridges through drama, talk or writing can transform the dry curriculum into personal living knowledge.

Search and Research: What Is the Role of the "Research" Paper in Schools?

One of the most discouraging aspects of talking with teachers about student writing is to be reminded of how much time is being spent on "research" papers or "reports." While this phenomenon is most apparent in high schools, it characterizes considerable writing instruction as early as grades three or four. In many cases it's virtually the only kind of writing done in the "content" areas of junior and senior high schools.

Such assignments are at best useless and more often counterproductive. They encourage copying rather than original thinking. They're rarely based on real questions that students ask. They're unconnected to anything the student knows or is learning. They ususally require excessive attention to form (footnotes, bibliographies, etc.) with much less focus on ideas. And they're too often exclusively focused on library-based information-gathering rather than on encounters with the real world through observation, experimentation, or interviews.

Much of this goes on, particularly in high schools, because of a misguided belief that colleges require it. Although some colleges do place considerable emphasis on matters of form and style for documentation, the use of such forms is usually seen as means, not ends; to deal with them otherwise distorts their function. The best outline, the most complete set of 3 x 5 cards, and the most scrupulous adherence to manuscript conventions will not substitute for asking real questions and developing clear answers.

Students must learn to give evidence for their assertions. This in turn requires that they know what sorts of evidence count. The growing ability to use and support generalizations is one of the learning objectives of secondary schooling. The shift from sterile research papers to evidence papers based on real inquiry would be a dramatic one, particularly if methods other than library research are permitted, even encouraged. This is probably the most vital shift of all: toward observation, interviews, surveys and the like as sources of data and support for generalizations. Students will eventually turn to books and magazines for information, but getting them there by means of a personal connection will encourage their learning the spirit of inquiry along with whatever the particular topic may be.

Real questions and real data gathering and analysis methods are much less likely to encourage direct copying or other forms of plagiarism. If we can't emphasize the *search* rather than the *re* of research, it would probably be better to abandon the research paper altogether.

A Better Approach

Many teachers may object that they do try, but students just aren't interested. Without delving further into the sources of student apathy (but aren't we in part to blame?), it seems clear that students will be more interested in questions that relate their own interests and experience to what they're investigating than in a pre-assigned set of topics coupled to a rigidly formal format. Examples of the kinds of questions we've heard students ask include:

- Why are so many old people moving to Arizona?
- Why do I have to stay in school 'til I'm 16?
- Since I can buy a pocket calculator for under $10.00, why do I have to learn the multiplication table?
- How do video games work?
- What kind of writing skills do employers really demand of high school graduates?

While we're all for library research (and some of these questions demand it), it must be seen as only one source of potential data. The kind of oral tradition, history, and interviews collected by Eliot Wigginton's students in the *Foxfire* books and other direct means of data-gathering will be both more involving and more likely to lead to permanent learning than exclusive reliance on traditional approaches. In the last question, for example, a survey of actual employers can be taken to determine their views on the importance of writing.

Learning is, after all, what research is supposed to be all about. The key ingredient of the research paper is that the writer learn from the experience. And, like all writing, it's more important that the writer communicate her learning than produce an empty, error-free paper.

Writing Research Papers

The following assignment, whose objective is to help students learn how to ask appropriate and meaningful questions for doing research and discover ways of carrying through on it, is one we've used several times in in-service courses for elementary and secondary teachers. The success we and the teachers have had with it has convinced us that beginning with personal inquiry is the best way of moving toward more formal academic searches, whether the children are in 3rd grade or 12th.

Students should be grouped in two's or three's to brainstorm a list of questions they would like answered by their classmates. After a number of questions are formulated, the group should review them for common properties, eventually narrowing the list to, say, five. If, for example, all the questions but one are about age, sex, number of siblings, etc., then the one on the number of books read during the year would be dropped, since it doesn't fit into the focus of the research—an ethnographic study of the class perhaps.

The implication for the first stage of the assignment should be clear: learning how to narrow a topic—always a difficult part of any writing assignment—can be learned practically and purposefully; learning what kinds of questions relate to each other, building toward a general thesis statement, provides good experience in organization skills; students can find other audiences besides their classmates to use in their research—other classes and community or family members; and their questions can also be used as a basis for searching out material in books and magazines or pamphlets.

Once questions are decided on and written up, each group interviews all other members of the class to collect their data. When the data is collected, the groups reconvene to collate it. From this material, the groups will then construct some kind of visual representation—say a chart, or a graph, or a map—of their findings. Finally, the groups will write up summary statements of their findings, including a general statement of what they were looking for and what they found; any inconsistencies in their findings; any trends

they discovered from their answers, etc.

The main goal of this assignment is to get children excited about discovering things. Having seen this assignment in action ourselves, we can tell you that the teachers we worked with also got excited when the results start coming in. The students (and the teachers) couldn't always predict beforehand what they were going to find out and often were genuinely surprised. Sometimes they discovered that they hadn't asked enough questions, or that some questions were inappropriate to their overall "research design," or that the answers stimulated more questions they would have liked answered. All of these things made them even more eager to pursue further research.

Another major goal was making the connections between the collected data, the visual representation, and the written statement on it. Although students are given some instruction in school on the use of graphs and charts (there is even a section on the Math part of the SAT on graphs and charts), the material is never their own, so they never get to see how you transfer the information from one mode to another. This assignment creates a real context for such learning, and the more students do it, the better able they become in choosing the appropriate kinds of graphs for representing their work and for writing the best summary of what they've found.

One final goal for this assignment is to help students learn how to ask questions, to find out what questions are appropriate for the kind of research they want to do; and overall to learn how to construct a valid and interesting research project. What better way for them to do it than to learn by doing it themselves—to discover, as the teachers we worked with did, that you can't find out what fits or doesn't fit until you actually try it on for size?

A Final Challenge

A deadening aspect of too many American secondary schools is that there's virtually no academic interchange across departmental lines. In some schools there isn't even any within departments. Too many teachers go to work, close the door, and do whatever they do with no professional adult contact at all. One of the great potential impacts of a writing across the curriculum approach is that it provides a forum for the kind of professional talk essential to a dynamic school environment. Even disagreement and dispute can be healthier than silence and isolation.

A school's administration must be involved and supportive for a formal program to work. But tactically and practically, the best way to start such a program is with the small group of people who you know are interested and willing to try. Osmosis and subversion are probably more effective initially than confrontation and revolution. If the program begins to catch on, even an unsympathetic administration will come around. Even with a supportive administration, the idea of working slowly and with small groups probably

still makes better sense than the kind of big in-service production that leads to little change but great resentment.

While we're preparing to tackle our colleagues in other departments, we should also make sure that our own house is in order. Each English department should look at itself to see how much writing-to-learn is going on. English departments do ask students to write, but how much of that writing is intended to help students learn the content of English? What content is that? At the very least it's whatever instruction is given in literature, language, and knowledge about writing, and in some cases can include mass media, journalism, and much more. We can hardly be convincing to our colleagues about increasing the amount of writing they demand if we're giving multiple-choice tests on Shakespeare or fill-in-the-blank grammar exercises. How can we urge science teachers to teach vocabulary in context if we still give weekly quizzes from *aardvark* to *zygote*?

The best place to start exploring the possibilities and potential of writing-to-learn is with our departmental colleagues. We can help them rethink what they're doing while they help us. Every English department we've known with more than one member has been staffed with people who disagree with one another. Discussing the possibilities of using writing as a tool for learning in English can provide a positive professional forum for airing and resolving conflicts. The challenges of English teaching are too profound to ignore the best possible way we have of meeting them: using writing to learn.

WRITING TO LEARN

1. Talk to some of your colleagues in other disciplines about the opportunities for writing in their classes. What assignments do they give? How does writing grow out of their classroom activities?
2. Construct a list of the language components in each discipline that's taught in your school. Can you think up some appropriate writing-to-learn tasks for the components?
3. Choose a topic area from within science, mathematics, social studies, or the arts (including literature) which is most relevant to your professional concerns. Make up a learning activity based on the three-stage process described in this chapter, involving some writing which allows your students to explore the topic area.
4. Have the faculty in your school create one writing assignment for each of their disciplines based on the three-step process introduced in this chapter. Duplicate these; you have now begun a writing across the curriculum program in your school.
5. Try out the learning activity devised in Task 3 with your students or do it yourself if you're not teaching.
6. Briefly discuss what learning occurred as a result of the writing completed for Task 5. How did you or your students react to this assignment?
7. Speculate on some possible ways of evaluating the writing to learn assignments faculty came up with in Task 4.
8. Ask your faculty to evaluate their assignments (Task 4) based on the five-question criteria we've listed in this chapter.