

# Writing as Situated Thinking in General Education

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For over a decade, both general education reformers and scholars of rhetoric and composition have teased and worried the relationship between critical thinking and writing. Articles and textbooks in the two areas have come from such people as McClure and Davies (1989), Gaff (1991), Negin (1992), Cooper (1994), Russell (1995), Rosenwasser and Stephen (1997), Clewett (1998), Gesell (1999), Hoeller (1999), Ruggiero (2001), and Chaffee (2002). Both curricular reformers and writing specialists believe a connection exists, but two obstacles have prevented any definitive, or even tentative, conclusion from emerging. One is that we don't have a shared understanding of what *critical thinking* means, showing also the woeful lack of communication between these scholars and the epistemologists. The other is that we don't know how to measure it. But all educators want it. We equate thinking with learning. As Bruce Marlowe and Marilyn Page (1998) succinctly put it in arguing for a constructivist classroom:

How do you know if students *understand* concepts, issues, ideas, and problems? If a student repeats information, as often happens in a traditional class, it doesn't mean she understands anything or can apply this information in any way; it doesn't demonstrate learning or understanding-it simply demonstrates ability to repeat information. (p. 12)

Most of us would say we are able to recognize critical thinking. But how? What are the hallmarks, behaviors, demonstrations that tell us some kind of mental activity is going on in students' heads that results in the understandings in a written text? What should we call them, and how can we assess them?

Groundbreaking work has been done at Washington State University where Bill Condon has worked with disciplinary faculty to devise a rubric to assess students' critical thinking at mid-career, growing out of WSU's exemplary portfolio assessment. The University of Wyoming has done extensive work on critical thinking in agriculture. In each case, definitions of outcomes were locally and collaboratively derived. Even though these models are institution-specific, they provide working definitions for use in curriculum building and assessment. My feeling is that getting on the critical thinking bandwagon in general education reform is the surest and best way to implement writing across the curriculum, particularly at a large school with no formal WAC program like that at the University of Arizona. General education reform provides the impetus to engage faculty in rethinking teaching and learning, and interdisciplinary conversations to construct local definitions of critical thinking create openings for faculty to discuss writing. Working together to create assignments using common terminology for thinking can help students learn across the curriculum.

The Arizona's campus-wide writing program has been more theoretical than real. Between 1982 and 2002, we had a University Composition Board made up of five English department writing instructors

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who each had a particular outreach function. At best, only one or two of us were able to do anything about undergraduate writing except administer and read first-year placement tests and a mid-career essay test, which have both been abandoned; and teach an occasional faculty workshop. We had an Intercollegiate Writing Committee that has also disbanded because it was buried under layers of administrative bureaucracy and had no authority to set policy or enforce it. The break came when the Provost decided that our proliferating general education electives needed to be revised into a core curriculum that shared fundamental principles, concepts, and skills across disciplines. That was in 1996.

The vast array of lower-division electives were to be consolidated into three core subject areas in which all classes were interdisciplinary within the subject area: natural science, social science, and arts and humanities. All offerings had to meet the needs of non-majors and teach the fundamental principles and basic skills in the large disciplinary area. Each student was to complete at least a Tier One and a Tier Two course (building on the principles taught in Tier One) in each subject area. In addition to teaching the fundamental principles of the subject area, the courses had to provide adequate opportunity for students to write and perform college-level mathematical operations. A University-Wide General Education Committee was charged with screening and approving the new courses to insure that they met the new guidelines.

To assist faculty in designing the new courses, the provost funded summer-long working groups in each subject area to derive the fundamental concepts to be taught by all the courses in that area. The Writing Program took the initiative of placing writing program personnel in each working group to consult on the writing guidelines. We saw immediately that writing would serve students best if it were incorporated as writing-to-learn into the new curricula. Thus, as early as the working groups, we realized that we could overcome the faculty's initial resistance to "adding" writing to their often very large classes by promoting it as a way to help students acquire the fundamental concepts. Following the summer working groups, we applied for and received an Office of Undergraduate Education grant to offer faculty stipends for a semester-long workshop on writing-to-learn in the new courses, which were being taught for the first time in Fall 1997. We were able to pay \$500 stipends to twelve senior faculty members, four from each subject area, to take the workshop. It was strictly voluntary. Following the success of that workshop, we collaborated with the University Teaching Center (UTC) to continue working with other members of the general education faculty on writing. The UTC had received funding from the Office of Undergraduate Education to offer five-day workshops on the use of educational technology in the larger new classes. It made sense to all of us that writing could be incorporated more effectively into the new classes by using the technology--listservs, email, chat rooms, discussion links, interactive web pages, writing workshops, and electronic draft reading.

The faculty who chose to participate in the workshops, which took place mostly during the summers, were given laptop computers loaded with software. Between the semester-long workshop and the five-day intensive workshops, approximately 160 faculty in the new curriculum received in-service training in writing pedagogy that focused on critical thinking and demonstrating learning. I was the writing facilitator in all of the workshops until a year and a half ago. Now the former associate director of the UTC does all the instruction in her new position as the technology director for our Integrated Learning Center—a high tech classroom facility built specifically for general education classes and put into service in 2002.

These general education workshops have shown us that the concepts of critical and creative thinking are social constructs, varying according to discipline, and are rarely defined for students in those disciplines. Thus, just as written texts are contextualized and take conventional disciplinary forms, so do the thinking processes that go into them. For beginning college students, both are foreign

concepts, as is the idea that we write to articulate our *ideas*, rather than merely convey already formed knowledge. In facilitating the workshops, I discovered, however, that the assumption of disciplinary academics was that the mental behavior described by a particular term, such as *analysis* or *application*, has the same meaning across disciplines. But in interdisciplinary groups of faculty, we found that assumption far from accurate.

For example, the passage below from the same writing assignment in a social science general education course illustrates a certain confusion on the part of the faculty member about her own meaning of *analyze* [italics mine]:

After you have found a resource on your topic, read it carefully. Thinking about the following questions should help you begin to *analyze* and evaluate the article:

- What is the author's thesis? Do you trust the conclusions of the article? Why?
- Who is the audience for the text? How effectively does the author speak to that audience?
- How effectively does the author use the medium in which he or she is writing?

Your report should complete four tasks: it should provide a summary of the information in the article, *analyze* its assumptions and argument, evaluate its reliability and authority, and synthesize its ideas with class readings and themes.

The first use of *analyze* indicates the student is to observe, describe and evaluate specified *categories* of the article under study. The second, however, appears to mean something more like *identify* or *interpret*, with evaluation as a separate activity. A teacher of a general education science class uses the word to mean *interpret* and *evaluate*:

We will analyze articles and reports from New Zealand regarding the Golden Cross Mine. After reading about the controversy, answer the following questions:

- What constitutes a fact? Identify some sample facts.
- How do you identify bias? Give some examples of bias.
- What emotion does the author want from you. Give examples.
- What information is missing in the articles?

Finally, a general education assignment in humanities uses the word this way:

- *Analyze* how the ronin were following their strong sense of samurai duty toward their wronged master.
- *Analyze* how Confucian ideas could be used to justify condemning the ronin to death.

Many laboratory reports ask students to "analyze" the results of an experiment to determine why they came out as they did, which seems to ask for a complex set of thinking skills that are difficult to characterize and would be hard to walk a student through.

Therefore, if we are to expect writing to demonstrate disciplinary ways of thinking, particularly for purposes of assessing learning and problem solving, then each discipline must describe clearly the thinking processes intended by the terms they use, just as it does its vocabulary for field-specific concepts and conventional genres. Or interdisciplinary faculty could construct mutually agreed on definitions across their curricula. The latter seems more helpful to beginning students, as long as they

understand that these definitions are not absolute, but merely approximate a behavioral description. Using a common set of terminology for thinking behaviors would teach and reinforce a working vocabulary for metacognition, which students can then apply to the specific thinking required for tasks in different contexts and help them become consciously aware of the mental processes by which they are to address a typical disciplinary problem.

Our general education faculty were much more excited about focusing the new curriculum on critical thinking about concepts than on teaching "skills" like writing and math. But persuaded that they could actually see students' thinking in writing activities that didn't necessarily have to be formal or graded, they decided the first thing they could do to improve their students' thinking was to negotiate a common set of terms for mental behaviors they wanted to see in students' writing. They believed that the terminology should be applied across the lower-division curriculum since students are not yet steeped in disciplinary modes of thinking. They felt this would make the transition between disciplinary discourses easier for beginning students because they could use the categories for thinking to analyze how a disciplinary text embodied the thinking required and then apply a now-familiar thinking behavior to composing an answer to a different discipline's kind of problem.

In our pilot workshop, we assigned the twelve self-selected faculty into two kinds of working groups: intra-disciplinary groups of four from the three general education subject areas and interdisciplinary groups of three. Each faculty member participated in both kinds of groups. In both groups, they shared their writing assignments to accomplish two goals: 1) identify the kinds of thinking these assignments entailed because they were dissatisfied with the quality of thinking their students showed in the tasks they assigned, and 2) find ways to stage the thinking/writing assignments, limiting the number of thinking operations they had to perform simultaneously.

We arrived at these goals first by asking participants to write an answer to this question: "Why do we write and ask our students to write in the university?" Most said they themselves wrote to clarify their thinking and to share their knowledge with peers, but none mentioned they used writing to help their students clarify thinking and solve problems collaboratively with peers. Though they said they wanted students to demonstrate "critical thinking," they found their assignments generally only asked students to recall and interpret information in specific ways they had been taught—follow a recipe of specific operations. They rarely asked open-ended questions or entertained genuine interpretations.

Thus it took an entire semester for the first group of faculty to arrive at the definitions we decided were critical thinking skills students needed to demonstrate in order to succeed in college [see pp. 14-15 below]. Provisional agreements resulted only after sometimes heated debate about what mental behavior was intended by a specific term and when that behavior was required in particular disciplines. Of course, each discipline had a proprietary interest in maintaining its own internalized definitions for these terms, but sometimes, definitions appeared as individually idiosyncratic as disciplinary. This difficulty was overcome when participants decided that they had been too vague about what took place when analysis, synthesis or creative thinking was called for. What we consequently accomplished, they felt, was more "accurate" definitions of terms because their earlier usage in assignments had failed to make appropriate distinctions among them. *Analysis*, for example, was seen as a catch-all word for anything beyond recall, including not only categorization and description, but interpretation, synthesis and application as well. We arrived at *invention* as an inclusive term for the kinds of creative responses required across different disciplines, from solving new mathematical or physical problems to unusual and innovative interpretations, syntheses and applications of abstract concepts or principles.

Creating shared, working knowledge is not unique to college faculty. Coinciding with reform in university general education programs over the last decade, corporate America has been constructing solutions to business problems by the process called *group learning* or *team learning*. Corporate stakeholders have been pressuring the academy to teach skills for this kind of collaborative deliberation. For example, in *Common Knowledge: How Companies Thrive by Sharing What they Know*, Nancy Dixon claims that creating common knowledge does not result directly from experience alone, even collective experiences. Companies discovered that, in order for a team to translate experience into knowledge, the members needed more time to reflect on their common task—think about it—with other teammates. A team may have had an extraordinary success, "but the organization finds itself unable to repeat that success because the team has not taken the time to build the knowledge about why it worked so well" (p. 18).

Dixon goes on to explain how common knowledge is "leveraged" [which I take to mean how the group works to construct it from individual contributions, or as she says, "transfers" knowledge from one to another]. She gives three variables that contribute to this socially constructed common knowledge: 1) knowing who the intended receiver is in terms of similarity of task and context, 2) knowing the nature of the task in terms of how routine and frequent it is, and 3) knowing the type of information that is being transferred in terms of where it lies on a continuum between tacit and explicit (22, 26).

Our general education faculty were thus constructing an understanding of the thinking they wanted from students by raising to their conscious awareness tacit disciplinary understandings and making it available for reconstruction through conversation. When their group work made these tacit understandings explicit, the participants realized just how different their assumptions were and why students would be confused when moving from one discipline's problem solving process to another's. They realized that their assignments didn't explain the thinking process by which an answer or solution could most likely be found because it was often tacit knowledge in the discipline, internalized from numerous repetitions. For disciplinary novices, however, explicit process descriptions have to be provided.

We can see from Dixon's variables that effective knowledge construction is a highly rhetorical activity, which she notes also requires a common language for common experience. Thus before our faculty could accomplish their goals in the workshops, they had to translate what they knew into a form that others could understand and apply to their particular contexts. They did this first in their intra-disciplinary groups and then shared their disciplinary decisions with their interdisciplinary groups.

These corporate learning principles, once articulated, can be directly applied in classroom pedagogy by 1) allowing students to work in teams on projects that require individual, complementary contributions in knowledge and thinking; 2) giving explicit instructions for the task, including a full description of the thinking required to meet the intended goal, audience and purpose; 3) teaching audience awareness for both effective team discussion of an assignment's requirements and effective presentation [preferably assigning team work on projects for authentic audiences], 4) building in the necessary time for team members to communicate about their work both orally and in writing before, during and after the activity; which means 5) staging one or two complex projects that occupy an entire course, rather than assigning many small tasks, in which similar tasks are merely repeated. Translating the experience of a task repeated many times will not result in knowledge, according to Dixon, a claim she illustrates with the old joke about the teacher who, rather than having twenty years of teaching experience, had the same experience twenty times (18)! No cumulative thinking or learning takes place.

If non-composition academics could be rhetorically persuaded to use such constructivist pedagogy and overtly teach a commonly defined set of thinking skills, then writing would not be seen as merely linguistic conventions applied after the fact to the thinking and learning required for knowledge making. It would make the kind of thinking required mutually understandable and explicit, and it would increase both students' and faculty's awareness of the developmental role of rhetorical practice in learning and demonstrating knowledge—both being social activities.

But that certainly is not a universal awareness at the moment. So, Arizona's Writing Program redesigned the second semester composition course to teach rhetorical analysis as the process by which students could analyze and emulate the writing in different disciplinary contexts. The culminating writing task for this revised course has become an essay in which students explain how the rhetorical analysis they have learned can be applied in their other general education writing tasks. They often voice awareness of how writing actually helps them think and learn in their other classes:

"English 102 has had the goal of teaching us writing, thinking, and research skills [for the University] through successive revision of our ideas."

"Through more revision of writing, we were able to further understand our assignments' purposes and the skills they were trying to teach us."

The analysis of the four contextual elements to make my six textual choices provided me with a structure I will use the rest of my academic career. . . . I enjoyed this aspect because it allowed me to be more creative."

"The [writing] process changes because the thinking changes. Information has to be analyzed and interpreted differently depending on the audience."

I would argue that overtly describing the thinking process required for performing writing tasks will shorten students' learning curve and make writing the invisible activity that naturalizes it as integral to the learning process. But if the thinking required is not clearly articulated for novice scholars, they can't perform it adequately, and their writing will demonstrate that. In every workshop, I advocated that the faculty show students their own thinking/writing in progress and stage their assignments to allow students to go through a similar process. This disabuses students of their belief that good writers are born, thinking and writing are separate activities, first drafts can be final drafts, and professors are automatically expert writers because of their field knowledge, as though we write without audience feedback and our ideas come to us full blown in a single burst of mental inspiration. They need to see us struggle to show *our* thinking in progress and the dialectic process we use with our professional peers.

## Teaching Writing as Shareable Thinking

Once our first group of faculty had derived a common lexicon for thinking, the successive faculty groups endorsed them with very little discussion, perhaps because their focus was now on applications for the new educational technology being made available to them, and they were less interested specifically in assessing learning. They did, however, discuss and create writing assignments that could be staged for intervention with the help of the technology, and they used the first faculty group's assignments as models. During the second year of the new curriculum, I co-wrote

a more elaborated version of the writing component in the general education classes, based upon the writing assignments I had collected to date (see statement in Appendix A).

Since equal numbers of our original workshop participants came from the three core subject areas, we first attempted to discover what was common about writing in their courses that they could all teach. All participants were from non-composition required courses, and all disavowed any knowledge about how to teach writing, by which it became apparent they meant they could not instruct students in the basic rules for linguistic conventions and text organization. But once they had answered and discussed the initial question (why they wrote and wanted students to write), the participants concluded that the purpose for their students' writing, as well as for their own, was to think through intellectual problems and share that thinking with those who could give knowledgeable feedback to help them clarify it.

But we hoped the workshop would also uncover the writing assumptions for specific disciplinary content and help us discover whether some underlying writing principles could cross disciplinary boundaries, by making those assumptions explicit, a question posed by Charles Bazerman (1999). My co-facilitator and I, therefore, divided the participants into the two kinds of peer working groups in order to help them articulate disciplinary knowledge first and then translate that knowledge for people outside their field, whose understanding would more closely approximate that of their students. Participants spent half of each workshop session working in each group.

Predictably, they listed demonstrating understanding of course material as a top priority for students, but as I said earlier, they did not list for students what they considered the principal objective of their own writing: to clarify and organize their thinking and revise their ideas through peer feedback. They listed many kinds of informal writing they did themselves to think about the complex problems they were researching, which they rarely asked students to do. These included recording their progress and reflecting on how to interpret it, drafting sections of a report or article out of order or working on several parts of the text concurrently as their ideas came to them, submitting preliminary drafts or "concepts" to colleagues, and preparing conference papers and posters. Even their idiosyncratic note-taking methods were apparently rarely shared with students, and few actually asked to see student notes. None had ever mentioned the formal peer reviews their published work had to undergo. The only differences that appeared among the three intra-disciplinary groups were in the specific kinds of thinking they mentioned emphasizing and the genres in which they typically wrote, though they did say they at least modeled, if not taught, how to write in these genres.

After ten week-long UTC workshops over the course of a year and a half, I began to see some disciplinary thinking patterns emerge. The scientists, for example, emphasized analysis, interpretation, synthesis, and application over exploratory, "creative," and descriptive thinking. Though when they discussed these in the large group, they maintained they actually did these kinds of thinking as well, but had merely assumed them as preparatory for more elaborated analyses and complex applications. They also assumed that their interpretations had to be original, therefore inventive. The genres they tended to produce ran the largest gamut—from traditional research articles for professional journals to "posters," popular press articles, educational materials, and especially in-house reports, grant proposals, and patent applications.

The humanities group also emphasized analysis, but used the more restricted meaning of it, directly teaching specific analytic categories for objects of study that students were asked to observe and then describe, using their field-specific categorical terminology. For them, description was highly interpretive. Inventive interpretation was overtly required and unstructured writing often assigned to scaffold students into getting there. To them, research meant principally synthesizing sources as a

preliminary step towards interpretation and invention, whereas for scientists, research meant designing (inventing) experimental models for testing invented hypotheses based on observations.

The social scientists fell somewhere in between, some fields resembling the humanities more; some the sciences. Psychology, archeology, anthropology, geography, philosophy, and sociology seemed more "scientific" in methodology and the thinking expected, certainly in the data the faculty wanted students to analyze and interpret. But history and the various cultural and ethnic studies disciplines preferred such methods as descriptive ethnographies and interpretation of social and cultural artifacts, much as researchers in humanities do. Clearly, we saw one of the endemic problems of higher education-departmentalization-resulting in regional, mutually exclusive languages and the need for both faculty and students to participate in interdisciplinary discussions. This, of course, was one of the principal goals of the new core curriculum. Not only do learners have to communicate with each to build knowledge, so do disciplines. Every workshop participant wrote on his or her evaluation that they "learned so much," from their interdisciplinary groups, "were stimulated by the cross-disciplinary discussions," and "knew a lot more about thinking and learning than they had ever dreamed."

By the end of the first semester, the participants were able to agree on common definitions of commonly required thinking skills. They are very concise and have had buy-in from every other group of core instructors in succeeding workshops because, as the first group said, no one had ever discussed these things with them, so they hadn't consciously thought about them. These are now our local working definitions for the 160 or so faculty and their students who have had the opportunity to talk, think, and write about them:

- **Observation and Description:** Students are able to look at a phenomenon under study, *identify its salient features, and use appropriate vocabulary* to describe it.
- **Analysis:** In order to recognize the salient features, students can determine or *discover categories of features* to be studied and then use these categories in their descriptions of the whole.
- **Synthesis:** Students can *see the similarities and differences* among concepts and phenomena in order to integrate data from multiple sources through deduction.
- **Interpretation:** Students *derive meaning* deductively from phenomena or ideas by applying a combination of thinking skills to them.
- **Application:** Students are able to *apply deductively derived principles to a new or unfamiliar case* through inductive reasoning.
- **Evaluation:** Students can identify relevant and valuable data or observations to *weigh a phenomenon against a standard*, which they may also have to derive by using a combination of thinking skills.
- **Invention:** Students entertain multiple perspectives and generate novel and innovative interpretations, solutions, or principles before arguing for a particular one. They are comfortable with ambiguity and take authority for a personal interpretation, application, or solution.

We discovered that the sequence of these operations depends on the individual and the task, but several are often done simultaneously, and they are recursive--producing greater and greater clarity and complexity each time they recur. The wording of these definitions has evolved into their present form over the course of the workshops, and we continue to reconstruct them whenever we work with



new faculty. They are certainly not immutable, but depend on the particular participants and the dialogic dynamics among them.

The ETS Tasks in Critical Thinking, which we piloted last year to see if our new curriculum were teaching students necessary thinking skills, elicited similar mental behaviors, but their definitions are less clearly defined, and the definitions may or may not match these, again showing how little agreement there is on what we mean by *thinking skills*. Therefore, it is extremely important that individual programs and institutions come up with their own shared working definitions, or they cannot design valid assessment instruments for the learning they want to test, if thinking and learning rather than specific content knowledge are what they want to evaluate. Most of us have theoretically little interest in the latter kind of "common knowledge" for many reasons. It is not politically correct because some cultural knowledge would be valued over others, it may not be useable in unfamiliar contexts without understanding a principle or process, it will be superceded sooner than later as our knowledge base expands, and it is not readily assimilated without existing mental schemata to attach it to. Our new core curriculum, thus, emphasizes foundational knowledge and fundamental principles, rather than knowledge of discrete and esoteric data. We are trying to foster interdisciplinary problem solving and the "interdisciplines" that cross subject areas because they teach *processes*. They involve developing common languages for thinking, writing, and math operations, as well as for computer technology, foreign cultures, art, and emotions—in all cases, the processes for problem solving.

Therefore, gone is the preponderant dependence on multiple-choice and short-answer tests. At best, these tests can only elicit one quick mental behavior that may or may not go beyond simple recall. What frightened the implementers of the new courses was what they perceived as the very time-intensive work of reading extended written texts. So the business of our writing-across-the-curriculum workshops became how to handle the paper load and still see what students are thinking and learning. Naturally then, we had a captive audience for all of our ready-to-hand, writing-to-learn activities. Informal, staged, and ungraded short writing that builds toward sophisticated thinking projects came as a vast relief to faculty who had never been interested in learning about them before. We also have a highly funded and expanding Teaching Teams Program, in which students themselves are taught group facilitating strategies to foster the kind of dialectic classroom necessary for interactive student learning.

## Teaching the Writing Process as Rhetorical Analysis

Using our locally constructed definition of *analysis*, our first-year composition program can now link rudimentary rhetorical theory to the thinking required in the other disciplines, and we are foregrounding rhetorical analysis in all of our first-year courses. The nationally endorsed Outcomes Statement for First-Year Composition, written collaboratively, of course, by the composition discourse community and aiming toward the understanding of rhetorical principles, are the basis of the program. But we recast them into the critical thinking terminology we want to share across the general education curriculum and into an argument for our colleagues in general education that composition is, in fact, teaching a generalizable theory and process that are based on the same thinking skills they, too, want students to learn. In constructing this understanding locally, we can claim that the thinking/writing process is an "interdiscipline" operating in all of their fields, a term coined by Thomas Miller (2001) for the role of rhetoric in creating disciplinary identities.

In faculty development workshops, I, therefore, teach the vocabulary for categories used in rhetorical analysis. We have handouts defining the categories for the appeal, text and context (see Figure A below), and checklists and rubrics for grading writing based on them (see Appendix B). We define

and talk about how to use the categories for the appeals to assess effective textual choices for particular context constraints.

*Figure A: How Writers Make Effective Rhetorical Choices*

Every time we write, we face a different writing task because the circumstances for that writing, or its **context**, are probably new. Good writers make their writing accomplish what they want by 1) analyzing all the aspects of the context, 2) making choices about all parts of their text in light of those aspects, and 3) revising until everything about the text satisfies its particular audience, purpose, situation, and stance.

The combined **requirements of a writing or speaking context are the rhetorical or contextual constraints**. Writers must identify and analyze these requirements to make appropriate and effective decisions when writing with the fewest revisions. Ineffective writers don't do this analysis because they mistakenly believe that the first way they say something is the best or only way to say it. That is never the case; writing can always be made more effective by revising each aspect of the text to address the context better. For example, one can always improve the *content*, *style*, or *organization* based on a clearer understanding of the *audience* and *purpose*.

<p>By thoroughly analyzing these aspects of the rhetorical CONTEXT:</p> <p><b>AUDIENCE</b></p> <p>Who are the intended readers? What information do they want or need? What is their background in this? What is their interest in this? How do they feel about the writer?</p> <p><b>PURPOSE</b></p> <p>How are readers supposed to react to this? How are the ideas intended to help them? What are readers supposed to think or believe after reading this?</p> <p><b>SITUATION</b></p> <p>What occasion inspired this text? How does this text relate to the occasion? How are the readers supposed to behave in this occasion?</p> <p><b>STANCE</b></p> <p>What attitude does the writer have about this topic?</p>	<p>Good writers make effective choices about these elements of their TEXT:</p> <p><b>CONTENT</b></p> <p>What is the concrete information needed for these readers? What is the thesis or main point to organize this information? What thesis support is logical? What are good illustrations and explanations for the points?</p> <p><b>ORGANIZATION</b></p> <p>Where is the main point? Why? What is the order of the topics?</p> <p><b>FORMAT</b></p> <p>How are headings, graphics, bold, etc. used to help the readers see the ideas and organization of this text?</p> <p><b>STYLE</b></p> <p>Is it formal or informal?</p> <p><b>TONE</b></p> <p>Is it serious, friendly, ironic, natural?</p> <p><b>LANGUAGE</b></p> <p>What vocabulary is appropriate for the intended readers? Do the readers expect accuracy in grammar and mechanics?</p>
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What attitude does the writer have toward the intended readers?	
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We also teach faculty to make the contextual constraints for their assignments explicit in their instructions, and preferably authentic for students to perform. Many of them are now designing writing in genres for audiences other than themselves in order to give students experience addressing various non-academic readers with different expectations and adapt their writing strategies to multiple kinds of contexts.

In the second semester of our first-year composition requirement, we are now asking students to pursue an inquiry project in a field of their choice and teaching them how to make appropriate rhetorical choices for presenting the results of their research to an audience they themselves choose. They do rhetorical analyses of both articles by our faculty in the fields appropriate to their research topics and often the assignments they write for their general education classes. They also analyze the uses of different writing genres and media, all of which must guide the final presentation of their research. Then they do a complete contextual and textual analysis of the project they intend to write, which we assign as a "proposal." Finally, they produce the project, which may take any form in any medium, as long as it is contextually appropriate, the textual choices are effectively executed for the particular context, and they go through the process of composing, submitting drafts for review, and revising until the text is appropriate and effective for its intended context.

In addition to emphasizing that this process can be transferred to the writing assignments students do in their other classes, the revised curriculum allows them to pursue an authentic inquiry project for a context they can understand. Since they have not yet been introduced to a particular disciplinary discourse, they have a better chance of making appropriate textual decisions for the contexts they know. And they have had their awareness of different textual conventions raised by comparing what they write in English with what they write in other general education classes. Allowing them the opportunity to research a topic on which they already have some expertise also gives them a better sense of their own rhetorical agency, which has a significantly positive effect on their tone, style, and language choices.

The shared knowledge we attempt to establish among our students as they cross the disciplinary boundaries of their general education is that thinking and writing are inseparable processes determined by specific *contexts*. The processes by which they express their thinking in writing is always *contextualized*, and rhetorical analysis is the thinking behavior necessary for discovering strategies to address different writing tasks effectively. Kornhaber and Gardner point out that modern mass schooling has traditionally decontextualized both activities, but the thought processes of professional field scholars exemplifies just how much they are dependent on context (162-3). We feel that creating a "critical mass" of general education faculty who share a common lexicon for the thinking they want to see and for rhetorical analysis will help students begin to transfer writing knowledge across subject areas.

Foregrounding thinking skills in the outcomes for general education naturalizes the role of writing in the curriculum because it is the obvious way to assess students' thinking and learning. At Arizona, therefore, we are working toward a mid-career assessment of general education conducted through the assessment of a portfolio of general education writing, and we are reaching out to our feeder community colleges to encourage them to implement exit portfolios for transfer evaluation.

## Conclusion

This essay has made several knowledge propositions, all of which were constructed by, and are subject to, the scholarly dialectic of a constructivist epistemology. Let me review them by way of summary and invitation to response.

First, language is the medium for thought because it provides the symbols for abstractions that can be mentally manipulated. Second, ideas result from internalized conversations. Therefore, knowledge is socially constructed through linguistic practices and is culture specific because each discourse community has its own "vocabulary" of symbols for its concepts. As Stuart Chase claimed in "How Language Shapes our Thoughts," "We cut up the seamless web of nature, gather the pieces into concepts, because, within our speech community, we are parties to an agreement to organize things that way, an agreement codified in the patterns of Language." Disciplinary discourse communities, like other speech communities, construct their views of phenomena through their "cultural" language. As Benjamin Whorf observed in the same year Berger and Luckmann wrote *The Social Construction of Reality* (1967), people who speak different languages see [or I would say, *think about*] the world, differently (cited in Lindeman 1987).

If students are given opportunities to write in order to demonstrate their thinking in different general education contexts that share a vocabulary for the complex thinking sought, then the writing process, taught as rhetorical analysis for adapting texts to specific contexts, disappears as a separable activity in the learning process. Two important culture-specific variables have been held constant through a shared lexicon, facilitating knowledge construction across disciplinary communities. This shared lexicon for thinking also provides a shared lexicon for learning outcomes that can then be assessed across the general education curriculum by local disciplinary faculty. Portfolios prepared from assignments in students' multiple subjects should be reliable and valid indicators of whether students are "getting" the curriculum we have agreed we are trying to teach. Since fostering critical thinking and collaborative, interdisciplinary learning rank as high priority goals of Arizona's general education reform, we consider writing across that curriculum integral to achieving them.

If students are going to be multi-lingual in the several discourses to which they are exposed in general education, we have to provide them with a "grammar" to help them put ideas together in discipline-meaningful ways. That grammar provides the rules for thinking that different disciplines value differently. Grammatical terms, however, are shared among the natural languages in a given geographic region.

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## Appendix A: The General Education Writing Requirement

One of the principal goals of the new general education curriculum is to help students learn how to articulate core concepts of the new courses in ways that help them understand those concepts and demonstrate their understanding for different kinds of readers and purposes.

In addition, writing in the lower division is intended to prepare students for their mid-career writing assessment and for writing in their majors, particularly disciplinary courses designated as writing emphasis classes.

To meet these goals, general education courses are required to include a significant writing component that has the following features:

- Writing opportunities include **multiple formats**: both formal and informal, graded and ungraded.
- Writing for the course emphasizes **critical inquiry** and includes writing to think and learn, for example,
  - accurate description using course specific vocabulary,
  - analysis using field-specific categories,
  - individual interpretation of objects under study,
  - synthesis of ideas from disparate sources,
  - application of course principles,
  - individual evaluation of objects under study for a particular purpose,
  - inventive or creative thinking for novel situations or problem solving,
- Formal work for evaluation demonstrates **appropriate organization, style, vocabulary, and grammar** for its particular purpose, situation, and readers.
- Some writing for the course receives **feedback and revision** before being evaluated.

The amount of writing for the course is at least **2500 words**, with at least one assignment of 500 words or more.

## Appendix B: Optical Science Writing Project Peer Review Worksheet

IDEAL TEXT DESCRIPTION	POSITIVE FEEDBACK	IMPROVEMENT SUGGESTIONS	SCORE
HIGHER ORDER CONCERNS:			
<p>CONTENT</p> <ul style="list-style-type: none"> <li>• Abstract gives concrete summary of essay's thesis</li> <li>• Biography gives concrete information</li> <li>• Clear thesis claiming scientist's contribution</li> <li>• Appropriate equations included and explained</li> <li>• Appropriate figures included and explained</li> <li>• Research information clearly identified and documented</li> </ul>			
<p>ORGANIZATION</p> <ul style="list-style-type: none"> <li>• Abstract and essay in order following identification information</li> <li>• Thesis at end of an introductory paragraph that connects biography to thesis</li> <li>• Research information is properly introduced and explained before being used.</li> </ul>			
<p>FORMAT</p> <ul style="list-style-type: none"> <li>• Cover page has title, by-line, date, and class</li> <li>• Abstract and Biography have subheads</li> <li>• Equations and figures correctly labeled</li> <li>• Secondary subheads may be used for easier reading</li> <li>• References are listed in proper bibliographic form at end of essay.</li> </ul>			
LOWER ORDER CONCERNS:			
<p>STYLE</p> <ul style="list-style-type: none"> <li>• Sounds and looks like a formal academic paper</li> <li>• Format not flamboyant, using html options for readability</li> </ul>			
<p>TONE</p> <ul style="list-style-type: none"> <li>• Sounds objective, but natural</li> </ul>			

<ul style="list-style-type: none"> <li>• Sounds informed</li> </ul>			
<p>LANGUAGE</p> <ul style="list-style-type: none"> <li>• Level of usage is appropriate to intended readers</li> <li>• Familiar words used rather than esoteric ones whenever possible</li> <li>• Spelling and punctuation are accurate</li> <li>• Sentence grammar is clear, straight-forward and easy to process</li> </ul>			

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