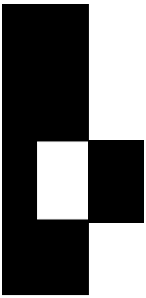

On Writing Instruction and a Short Game of Chess: Connecting Multiple Ways of Knowing and the Writing Process

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> Writing represents a unique mode of learning — not merely valuable, not merely special, but unique . . .Writing serves learning uniquely because writing as process-and-product possesses a cluster of attributes that correspond uniquely to certain powerful learning strategies (Emig 89).

Janet Emig's 1977 article "Writing as a Mode of Learning" has been one of the most influential texts in the modern writing-across-the-curriculum and writing-to-learn movements. WAC proponents have generally substantiated Emig's assumption that by putting ideas into words we distill or clarify our thinking. Composition and WAC publications are filled with articles documenting the success of writing-across-the-curriculum throughout the University. I'm not here to argue with the success of writing-across-the-curriculum. As a writing teacher, I'll be one of the first to argue for the link between cognition and writing. But as a writing teacher I always return to the question "How do I teach writing better?" If writing is supposed to help us understand difficult concepts in chemistry, for example, what's to help us understand difficult concepts in writing? What kind of heuristics will help students learn to compose with words? Does writing lead to better thinking about writing? Maybe for some students, but other students who are self-proclaimed "bad writers" or for those whose battle call is "I hate writing!" writing about writing seems an endless tautology. So what can help us teach writing to those students for whom words are not easy? Maybe chemistry? Or Architecture? Maybe the way of thinking spawned when sketching a design or constructing an equation is a more direct route to coming to writing for these students than trying to compose with words. Or maybe by translating concepts across ways of knowing, those self-proclaimed "bad writers" will find the seemingly foreign world of writing less strange and frustrating.

If we return to Janet Emig's "Writing as a Mode of Learning" and read a bit more carefully, we find that Emig does not say that other forms of composing are useless. Her reason for considering writing a unique mode for learning was that writing represented "the most available medium for composing" (89). She says that other forms of composing are more difficult to legitimate in the academy or more difficult for students to grasp:

> Most students are not permitted by most curricula to discover the values of composing, say, in dance, or even in film; and most students are not sophisticated enough to create, to originate formulations, using the highly abstruse symbol system of equations and formulae (Emig 89).

Emig was right that some forms of knowing are privileged over others in the academy, but that does not mean that they do not exist or that we should dismiss the potential they hold for learning. Secondly, Emig underestimates students' potential in composing with symbol systems like equations and dance. Within their various disciplines, students MUST learn to negotiate these abstruse symbol systems. For example, in order to think like an electrical engineer, you must become proficient in the language of equations and circuit diagrams. In order to begin to think like a dancer, you have to learn to compose in movement, not in words.

In "Multiple Intelligences in the English Class: An Overview" Peter Smagorinsky calls for us to expand writing-across-the-curriculum to "composing across the curriculum," and he encourages educators to consider "the potential for unconventional composing processes to enrich students' experiences in school" (15). The value of understanding other ways of knowing and composing is enormous for those of us who teach writing to students whose best way of understanding writing may be non-linguistic. By opening "composing" to other ways of knowing, we invite students to expand the boundaries of academic knowledge-making by deconstructing the myth that there is one right way of thinking and being "smart." Moreover, we ask them to become self-reflective about thinking. By becoming "metacognitive" about thinking and learning, we make them better problem solvers. For example, to explicate their own way of thinking and the role of words in that thinking process, they must question what it means to compose, to create ideas and put those ideas into action.

One of the first barriers to erase in order to expand the idea of "composing" is the division between academic and non-academic thought. Chiseri-Strater's case study of two students at the University of New Hampshire provides striking evidence of what happens when students' private and personal ways of knowing are fragmented. Nick and Anna, the two students in Chiseri-Strater's study, both struggle to maintain a personal aesthetic approach to academic work via art, music, and dance while devoting much of their time to the acceptable public rendering of those

ideas by "doing papers" (151). Chiseri-Strater attacks those like Harold Bloom and E. D. Hirsch who "encourage a very narrow view of what it means to know," finding that students' "singular ways of interpreting the world go unnoticed by educators as the lines are drawn between private and imaginative experiences and public academic expression" (xvii). Cheseri-Strater concludes that, "An expanded definition of what it means to know through aesthetic experiences invites students to bring their personal literacies into our classrooms to forage together for the intellectual nourishment of the group" (155).

Secondly, in order to expand ideas about "composing" we have to ask ourselves what ways of thinking are valued in our disciplines and professions. Cheseri-Strater notes that students are offered little holistic understanding of disciplinary epistemology, and yet there are major differences in the ways that various disciplines expect students to process and display information. In "Speaking of Knowing: Conceptions of Understanding in Academic Disciplines" Judith Langer asks "Are there essential similarities and differences in the ways various disciplines regard 'knowing'?" (69). Her answer is "yes," and she calls for teachers to reflect on discipline-specific ways of thinking. In a study of university professors, however she found that among the teachers she studied, "notions of discipline specific ways of thinking were mostly implicit" (Langer 84). Langer finds this void disturbing, arguing that "If teachers are to help students develop higher-order reading, thinking, and writing skills, they must be able to articulate the ways of knowing that are central to particular domains" (70).

In *The Reflective Practitioner* Donald Schon finds a similar phenomena in the professions and calls for an "epistemology of practice" (viii). While seasoned professionals often engage in "reflection-in-action," moments in which they reflect on their decision-making process, most "knowing-in-practice" is tacit (Schon 60). Through a series of vignettes, Schon shows how junior architects, psychiatrists, managers, and planners struggle to learn these tacit ways of thinking of their seasoned mentors.

What Langer and Schon show vividly is that as teachers and mentors we often fail our students by not making explicit the ways of thinking that are valued within our classrooms, disciplines, or professions. By analyzing our "reflection-in-action," we can begin to show students how we come to compose knowledge. In turn, by asking students to be metacognitive about their own thinking, we give them a powerful heuristic to understand the ways that knowledge is constructed. We challenge them to stretch their minds, ask questions, dispel stereotypes, and offer multiple perspectives (Armstrong 152). Secondly, by translating that understanding across disciplinary boundaries, we challenge artificial aca-

demic boundaries between departments to expand the limits of academic thought. Thirdly, in this translation process, we open disciplinary symbol and thinking systems to more creativity. Finally, by asking students to become metacognitive about their own processes, we make *them* better teachers one day.

Using Multiple Intelligence Theory

The work of Howard Gardner, Professor of Education and Codirector of Project Zero at Harvard University, gave me a conceptual way to think about multiple ways of knowing. Gardner's Multiple Intelligence Theory (MI) is a descriptive theory of knowledge that uses both biological and cultural paradigms to explain the concept of "intelligence." Originally trained as a neuro-psychologist, Gardner's life-long research with brain damaged patients at Boston area hospitals led him to question traditional notions of intelligence. What he learned through years of research was that the human mind is capable of many intelligences and that those ways of knowing are influenced by environmental and cultural experiences.

In his seminal book *Frames of Mind* Gardner defines intelligence as "the ability to solve problems, or to create products, that are valued within one or more cultural settings. Using a series of cognitive criteria, such as potential isolation by brain damage, existence of savants and prodigies, and susceptibility to encoding in a symbol system, Gardner outlines eight intelligences. These intelligences work in a complex matrix of thought and action, evidenced through everything from playing the violin to programming a computer. Following is a short synopsis from *Frames of Mind* of the proposed intelligences:

> *Spatial* - Most usually evidenced in visual thinkers, spatial intelligence is the "ability to perceive the visual world accurately . . . and to re-create aspects of one's visual experience" (173).
>
> *Kinesthetic* - As shown in disciplines from theatre to athletics to surgery, kinesthetic intelligence is the ability to master the motion of the body or manipulate objects with finesse (207).
>
> *Linguistic* - One of the two traditionally-prized intelligence(verbal section of the SAT), linguistic intelligence is sensitivity to the meaning, the order, and the sound of words (77).
>
> *Logical-Mathematical* - The other of the traditionally-prized intelligences (analytic section of the SAT), logical-mathematical intelligence is the "ability to handle skillfully

long chains of reasoning" as well as recognize patterns and order (139).

Musical - Sensitivity to pitch, rhythm, and other musical elements is the hallmark of musical intelligence (104)

Naturalist - The most newly "discovered" intelligence, the naturalist has a keen sensitivity to flora and fauna and their interrelations.

Interpersonal - Indispensable for group dynamics or counseling, the person with interpersonal intelligence has the "ability to notice and make distinctions among other individuals" (239).

Intrapersonal - Through meditation, religion, or philosophy, the person with intrapersonal intelligence can "access one's own feeling life" (239).

Gardner's theory is powerful for several reasons. One, it validates ways of thinking that are not traditionally prized in schools, treating those ways of thinking as "intelligences," not "skills" or "talents."[1] Second, Gardner's theory acknowledges the significant influence of "culture" upon the mind's development. According to his theory, intelligence is not something located only in brain physiology but something that also holds a deeply cultural resonance. Third, Gardner emphasizes the malleability of intelligence. Intelligence is not static upon birth. We can develop our minds, thus suggesting that the majority of knowledge is self-constructed as well as culturally constructed.

Many students already understand the concept of learning styles or have read of Gardner's work, so they readily accept that the brain has multiple avenues for knowing. What is difficult is getting students to become metacognitive about learning. To help guide the process, I review Gardner's theory and then ask students to do some brainstorming about thinking and learning. First I ask them Learning Questions:

1. Consider your interests. What interests you? What are you good at? Why? Do you have any special skills? What kind of intelligence might be involved in completing that skill?

2. How did you come to learn your interest? If you had to teach your special skill to someone, what would you want that person to learn? How would you teach your skill to someone else?

3. Consider what you're thinking about majoring in? Why does that major interest you? What intelligences are used in that discipline? What makes you think so? [2]

4. If you've taken classes in your major, what techniques or theories do you remember? Could you teach those techniques or theories to someone else?

After a class discussion about students' interests, we then talk about writing. By this point in their careers students have been writing for more than 12 years. It's important for them to consider the knowledge they possess about writing. Often students have never thought about writing on an abstract level, so I ask them the following Writing Questions:

1. Thinking about the way that you write, make a list of all the ways you begin to invent ideas when writing a paper. Do you think about those ideas in pictures? Music? Formulas? Movements? Do you have specific sources of inspiration or ways that you come up with ideas for papers? Do you talk to your friends or work alone?

2. When you first begin to put words on the page, what do you think about?

3. How do you envision the structure of your papers? Does that thinking process come in sections or strings or music?

4. If you get stuck when writing, what do you do?

5. What are your writing idiosyncrasies? Are you noted for a particular writing style?

6. When you think about the following terms, what do you think about? (Choose 2) flow, feel, strategy, voice, tone, rhythm, audience, composing, feedback, revising. What other terms have you heard used to describe writing? Are any of these similar to terms you've heard in other classes?

Diving In

At this point, I ask students to think about possible connections between the Thinking Questions and the Writing Questions. What I hope in their brainstorming is that they start weaving connections between ways of knowing so that the void between writing and music, for example, begins to disappear, and they can begin to see how the knowledge they're learning in music can be translated into what they're learning in the writing classroom. John, for example, wrote the following insights:

> My art helps me in my writing because it helps breaks things down, especially visually. I can break complex objects down to simple shapes in my head automatically without even realizing it. If I have a lot of things running through my head all at once, I can use this technique to break them down, and filter out the unimportant or irrelevant thoughts. I believe this is the reason why I can write a paper with out random sentences to jog my brain first. I can just pick out what I want, formulate a sentence with that, and then elaborate on whatever subject it may be.
>
> My interest in music helps me in a different way; it helps me with the fluidity of my writing. I think of each sentence as

> a jigsaw puzzle, and you need to together the words in such a way that it firms a mental image, or picture. It needs to fit together in order to be appealing to the ear. The same is true with a paper; it needs to flow so that it makes the paper easier to read. So I try to make my sentences have a kind of rhythm, and although they may not always have a certain rhythm, the exercise still helps me to make the paper easier to read.

For John, the connection between writing and art and writing and music was immediate and concrete. For other students, the connections between writing and thinking take on a more abstract sense. For example, Neal wrote, "The reason I feel I am a kinesthetic writer is the fact that when I am taking part in physical activities, my mind is more open for ideas. I think the higher my heart-rate, the more apt I am to ideas."

At this point, we discuss how to put together a presentation based on our brainstorming. I give students examples of presentations from previous semesters, but I leave the content and format of their presentations to them. My only requirements are as follows: 1. A clear explication or demonstration of the connection they want to make between writing and their thinking process. This must include a handout or a visual 2. A writing exercise based on the connection they see between the two processes. Since I'm not the expert in chemical engineering or juggling or salsa dancing, I leave the parameters of the class exercise up to individuals. From this point in the semester, every week we have a presentation at the beginning of class. For the first twenty minutes of class students present their ideas and have us complete a writing/thinking exercise based on their presentation. We have a short discussion about the presentation and each student writes a short reflective response letter to the presenter. In following class sessions I return to students' techniques to show students the value of their teaching tools.

After working with this technique for several semesters, I've found that students' presentations fall into two broad categories:

Alternative Composing — new composing or responding techniques based on models from other disciplines. Such exercises add to our repertoire of process writing techniques, such as mapping and freewriting.

Translating Using Metaphors — exercises that make a metaphorical link between writing and disciplinary epistemology. These presentations translate ways of thinking about writing into similar concepts used in other disciplines and expand our vocabulary for talking about writing.

Alternative Composing

In the following alternative composing exercises, students took composing, revising, or responding techniques they had learned outside our classroom and applied them to the writing process. This reflective think-

ing process re-enforces to students the idea that knowledge is not created in a vacuum and that every hobby, discipline, and profession has a method for making knowledge. Those ways of making knowledge need not be limited to curricular boundaries. Instead, techniques like sketching and focusing the body can be applied across the curriculum, and in particular, to writing.

Drew, an architecture major, used visualization as an invention strategy for his rough drafts. By turning writing prompts into a series of visual images rather than strings of words, Drew explained that he could begin to think of ideas more readily, via pictures, for his essays. He explained that if he tried to compose his initial drafts in words, he would "skip" ideas and couldn't keep in focus everything he wanted to say. By sketching a series of "scenes" of his first draft, however he could keep all the ideas in his mind together through a visual "movie" of his essay. He also explained that the visual relationship of the elements in his sketches helped him think of transitions between his ideas. For his presentation, he gave us a writing prompt ("What's on your mind?") and had us sketch the images we conjured while thinking about his prompt. The relationship and size of the images on the page suggested possible ways we might organize our papers or foreground certain ideas over others. Then, we began to add words to our sketches, using key words to focus on certain details in our sketches. Next, we began writing sentences. In slowly detailing in words what we had so quickly sketched minutes before, the written story of the sketch emerged in rich metaphorical language. If we forgot what we wanted to say, Drew suggested that we return to the drawing to remember ideas that might have gotten lost in the translation from images to words.

For highly visual-thinking students like Drew, inspiration is literally drawn through their visual renderings. For such students, words are often the accompaniment to their images, not their primary way of making knowledge. (As English teacher we usually think of pictures being the accompaniment to words.) The Creative Director of Turbine, Inc., a Microsoft Studio, explained the relationship between words and images for a designer as follows, "As designers, we think of images first. The block comes when you put the wrong foot first. When you try to get the image from the word, it won't work. You *have* to have the image first and then add the words. Visuals always come first" (Gaud interview). Donald Schon in *The Reflective Practitioner* found a similar relationship between words and images for architects. Schon writes that in the language of architectural design, a "spatial action language," words in-and-of themselves are "obscure" without their visual references (95). For students like Drew with powerful visual-spatial intelligence, the key to successfully teaching writing is not about helping them find ideas for writing, but helping them find the link between their visual ideas and words on the page. By beginning with

images, such students get a tangible beginning to the writing process before becoming overwhelmed by words. Nick summarized the value of Andrew's presentation for those students who struggle with words but find visualizing easy, "[Through drawing] I got to express myself without much trouble, and something significantly tangible was produced because of it".

For Andrew, the problem with words was also not solved by using traditional process writing methods. Andrew, a member of the Junior National Cycling Team, needed to focus his body for writing. He explained, "It's difficult for me to get things down on paper." He continued by explaining that part of that difficulty resulted when his mind became too active and disrupted the sense of "flow" he needed for writing. For students like Andrew who live their lives primarily through their bodies, an overactive mind while writing is a disruptive force that leads to frustration and resistance. His technique for overcoming this disruption was called "getting outside yourself," in which you "remove" yourself from the writing process. He called this process "self cleansing," explaining that you do whatever it takes so that you no longer "feel" attached to the writing. He asked us to try his method when we experienced writer's block. Andrew explained that "self-cleansing" had to be more than passive avoidance of writing; it was about investing your energy in an activity entirely unrelated to writing. Only when you were so absorbed in that other activity so that you no longer "emotionally attached" to writing, could you return to writing.

In *The Inner Game of Tennis* W. Timothy Gallwey describes the "effortless effort" that athletes perfect, so that the mind is quiet while the body performs: "only when the mind is still is one's peak performance reached" (Gallwey 21). Andrew's "self-cleansing" technique was about getting at this sense of a quiet mind. He achieved this sense mainly through cycling. When his mind was quiet, he could concentrate "without *trying* to concentrate" (Gallwey 22). Often athletes describe this sense as being "in the groove" or "in the zone." Being "in the groove" is about effortless effort, doing without telling yourself to do. From years of cycling, Andrew had learned this finely-tuned thinking process. He said "Only when I'm exhausted, I write." Andrew explained that when he was exhausted, the mental over-processing about writing goes away. He no longer needed to tell himself how to write; he could simply write. It's not surprising that those who reported the most success with Andrew's technique were other kinesthetic thinkers – a swimmer, a dancer, and a rower.

Kristy, a nursing major and self-described "psychologist," drew on her interpersonal intelligence to bring us strategies for peer response. She described her "Interaction With People" activity as a technique for successfully "communicating with others outside our familiar friendships and

associations." Indeed, the writing workshop is often about responding to people who are outside our familiar friendships. As teachers we can equip students with peer response techniques for responding to other's *writing*, but we also must equip students with techniques for responding to the *writers* whose work they are critiquing. As such, responders not only need to be good editors but good allies to individuals they may not know very well. Peter Elbow underscores the importance of being such supportive readers, "for improving your writing you need at least some readers to be allies, persons who wholly cooperate in the communicative transaction" (24).

To help our class rebuild a sense of community and open communication boundaries, Kristy had us do several ice-breaking activities. First, she gave us a series of question and response strategies for making conversation with a "stranger," thus showing us "how simple it is to become familiar with each other, have fun, and be comfortable all at the same time." In another exercise, she had us play a game that showed us the importance of remembering individual's names and details, thus underscoring the importance of thinking of each writer as an individual. As a writing teacher, I am always struck how successful response is really about finding the right words for the individual writer. In counseling terminology, such success depends on seeing the "patient" as "a series of one who must be understood in terms of the unique experiences of his life" (Schon 117). Kristy's exercise taught students the importance of considering each writer as a distinct "series of one."

Translating Using Metaphors

Metaphor is one of the most powerful tools we have for translating ideas from way of knowing to another. In fact, Lakoff and Johnson claim that by "experiencing one kind of thing or experience in terms of another" human thought processes are mainly metaphorical (6). Across disciplines and professions, within academia and outside of academia, we use metaphors to understand new ideas. Donald Schon, for instance, provides real world examples of how scientific researchers use metaphorical thinking to solve research dilemmas. In my writing class, students used metaphorical thinking to link everything from writing vocabulary and steps in writing an essay to music and pottery making.

A great example of the power of metaphorical thinking was the musical presentation by Chris and Paul. Chris and Paul, both musicians, were interested in explaining how terms like "phrases" and "form" were similar in writing and music. Chris explained his way of thinking about the project as follows:

> I broke down both topics MUSIC and WRITING and thought of them growing downwards like roots off a tree... In

> music there are so many different kinds of songs. Standards, free form, long, short, loud, soft.... and all by different musicians with different styles all trying to convey different perspectives using the same medium. With writing, I found it to be almost completely identical. Just different mediums. So you see, it was easy to find similarities; it was like comparing two different languages . . .

In their presentation Chris and Paul demonstrated how we could conceptualize those terms in the musical sense to give us new insight into the ways we use those terms when talking about writing. They taught us to count rhythm and read notes, reminding us "just like reading words requires learning a language, reading music also requires a language to learn." After teaching us to read music phrases, they then showed us that, as in writing, you put together groups of phrases in standard forms to make up a genre. They then performed a basic blues song as an example of a standard musical genre. As a final step, we broke down a standard academic essay to show the similarity between a musical form and a written one. That final step was a dynamic way to illustrate to students that "A good piece of writing not only has a rhythm (a musical quality), it moves with a larger rhythm of its parts" (Grow).

Devi, a business major and potter, used the power of metaphor to lead us through a demonstration of process by having us "compose" pottery. Her presentation metaphorically showed us the importance of process in the creation process and how each step in the writing process is akin to that done in pottery making. At the beginning she warned us: "If you miss any steps it will blow up in the kiln." First, we had to think of a purpose for our process — what were we going to create? Then we began wedging — pushing and pulling the clay to get the air-bubbles out and make the clay pliable. Devi likened this to brainstorming in which you "throw ideas around." Next, she likened the process of cutting out shapes in the clay to organizing a draft. Next, scoring and slipping the pieces of clay together, she likened that process to adding transitions to an essay. Finally, ready for the kiln, we made last minute adjustments to our clay vessels, making sure that those cosmetic flaws, like grammatical errors, didn't mar the final product. In the end, Devi's kinesthetic, hands-on approach to process was compelling, especially for students who often resisted the multiple draft process. Devi's kinesthetic teaching technique reminded me of those used by Linda Hecker and Karen Klein. Using kinesthetic exercises so that students "learn-by-doing," Hecker and Klein's kinesthetic activities teach students that essays can be "shaped, moved, rearranged, and moved again" (89). On another level, I thought Devi's kinesthetic metaphor for process would be especially compelling in a com-

puter-assisted writing classroom where the writing process often "flattens-out" when students compose entirely on-line.

In another presentation, Justin and Chris, two chess playing business majors, explained the concept of strategy, planning, and focus through the metaphor of making moves in a chess game. They explained that in chess as persuasive writing, you have to use spatial as well as logical-mathematical intelligences to "play the game in your head," anticipating the possible moves your "opponent" will make and your possible rebuttals to that move. Even with opening moves in a chess game, you have to think ahead. With each move, the possibilities for rebuttal change. Additionally, they explained that the objective of the chess player is not only thinking of the numerous possible moves of each piece, but also holding in view the final objective of the game.[3] Justin and Chris went on to explain that sometimes you have to sacrifice chess pieces in order to accomplish your larger goal. They likened that idea to sacrificing good ideas that are tangential to the main point of a paper. Their metaphor for sacrificing tangential ideas was powerful. As Gerald Grow reminds us, "One of the chief tasks of any writer is to find a way to focus the subject, to condense it around a central theme, approach, or organizing metaphor" (on-line). As a first year writing teacher, I think teaching focus is one of the toughest challenges in teaching writing, and I've used Justin and Chris's metaphor repeatedly to explain why we relinquish certain ideas for overall coherence.

Finally, when Shimauli and Riju, both avid badminton players and computer science majors, presented their connection between badminton and writing, they had an unexpected reaction from the audience. Their presentation used a logical-mathematical approach, diagramming the purpose of each player on the court as a step in their writing process. Pointing to the referee on the side of the court, they explained that the referee was like a writing teacher. Several students immediately disagreed with this analogy, arguing that the coach was the teacher NOT the referee. Students repeatedly returned to that image in our interactions, using it as a code for the way that they wanted me to respond to their writing: "OK now act like a coach. Don't tell me if it's a foul. Show me how to fix it"

Implications

By making links between writing and disciplinary ways of thinking (as well as ways of knowing that traditionally don't make it into academic classrooms but into dance halls, playing fields, concert halls, theatres, and performance art spaces), we ask students to expand their ideas about the boundaries of thinking, learning, and writing. When students become metacognitive about the thinking they engage in throughout their lives, they become owners of that knowledge. Moreover, by inviting students

into a discussion about disciplinary ways of knowing we open numerous opportunities for students to see disciplinary knowledge as malleable. We have to look no further than Talia for evidence. Talia wrote:

This type of thinking can definitely be brought into other areas of learning. Math and science both stress the importance of steps and a process. Economics, like journal writing, requires exploratory thought to reach possible conclusions about changes in the economy.

For students who consider themselves "bad writers," translating the writing composing process into other mediums can enrich their understanding of words. To conceptualize what I'm thinking, simply reverse the following quote from Connolly and Vilardi: "Writing must become the instrument for translating the seemingly foreign and unrelated but indispensable worlds of science and mathematics into comprehensible and relevant matters" (xv). The sentence for some students makes more sense read as follows, "[Science and mathematics] must become the instrument for translating the seemingly foreign [world of writing] into comprehensible and relevant matters" (Connolly and Vilardi xv). By deconstructing old ways of thinking about writing as purely a linguistic process, we can open the possibilities of literacy to more students and open our classroom to exciting new composing techniques

Critics may ask if using Multiple Intelligence theory really produces better writers or simply makes students feel better. I've found that asking students to become metacognitive about ways of knowing and how we can translate one form of knowledge into another asks students to become more engaged in their own learning. They become experts on their writing process and that makes them better thinkers about writing, which in turn makes them better problem solvers about writing dilemmas. In the semesters since I've started asking students to do MI presentations, I've found that students' process notes have improved dramatically, becoming more self-reflective and expansive. Moreover, students seem to find words more easily when they see the ways words connect to other parts of their lives.[4] Adam explained it this way:

> [The MI Projects] helped to show how writing is just like things we do everyday. It made the writing process not look so foreign at times. Being able to look at writing like playing a video game, taking a picture, listening/writing music, or even like mixing a drink, makes the whole thing look easier.

Conclusion

The modern WAC movement was founded on the belief that "writing is a complex process integrally related to thinking" (Russell 7). Yes, writing is a complex process integrally related to thinking, but so are other ways of experiencing the world, and we miss a real opportunity when we

overlook the importance of other ways of knowing in the learning process. Alternative methods of composing offer writing teachers a wealth of teaching tools for students who don't think of themselves as good writers or who "hate" writing because they find words foreign and difficult. In *Presence of Mind*, editors Alice Glarden Brand and Richard Graves write:

> The greatest need for growth in composition studies lies now in the ways we create meaning beyond what is currently considered acceptable knowledge. A comprehensible view of composing conceptually and practically must include these other ways of knowing — call them unconscious, automatic, ineffable, inexplicable. . . People are hungry for transformation (5).

The people most hungry for transformation are students. Students are hungry to make sense of the matrix of knowledge they are expected to negotiate between disciplines, professions, athletics, hobbies, interests, and the world. By offering students an avenue to make connections between multiple ways of knowing in the writing classroom, we help students acquire a personal ownership of writing.

In his 1997 article "Writing to Learn to Do: WAC, WAW, WAW — Wow!" David Russell outlines some of the larger goals of the WAC movement. He includes the following: active learning across the curriculum, scholarly exchange among faculty, helping faculty make connections with students and each other, and curriculum reform (Russell 7). I believe inviting a larger vision of composing and the making of knowledge can hold-true to these goals and take us to exciting new territory in the next century.

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Notes

[1] First year writing is a critical place to begin undermining those long-held beliefs about intelligence (especially when the first year attrition rates for some groups soars to 50% or more).

[2] This question can lead to a small mini-research project for students.

[3] As Justin and Chris talked, I thought of Donald Schon's interview with a product manager at a large American firm who explained "Product development is a game you can win, so long as you keep it open — so long as you remember you can redefine your target" (Schon 251). For these two business majors, the strategy needed in chess should be a good metaphor for the type of thinking they'll do in Management classes.

[4] The other unexpected result of using the Multiple Intelligence framework is that it invites students to envision "diversity" in new ways.

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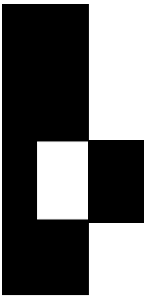

Learning the Language of Mathematics

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> Just as everybody must strive to learn language and writing before he can use them freely for expression of his thoughts, here too there is only one way to escape the weight of formulas. It is to acquire such power over the tool that, unhampered by formal technique, one can turn to the true problems.
>
> — Hermann Weyl [4]

This paper is about the use of language as a tool for teaching mathematical concepts. In it, I want to show how making the syntactical and rhetorical structure of mathematical language clear and explicit to students can increase their understanding of fundamental mathematical concepts. I confess that my original motivation was partly self-defense: I wanted to reduce the number of vague, indefinite explanations on homework and tests, thereby making them easier to grade. But I have since found that language can be a major pedagogical tool. Once students understand HOW things are said, they can better understand WHAT is being said, and only then do they have a chance to know WHY it is said. Regrettably, many people see mathematics only as a collection of arcane rules for manipulating bizarre symbols — something far removed from speech and writing. Probably this results from the fact that most elementary mathematics courses — arithmetic in elementary school, algebra and trigonometry in high school, and calculus in college — are procedural courses focusing on techniques for working with numbers, symbols, and equations. Although this formal technique is important, formulae are not ends in themselves but derive their real importance only as vehicles for expression of deeper mathematical thoughts. More advanced courses — such as geometry, discrete mathematics, and abstract algebra — are concerned not just with manipulating symbols and solving equations but with understanding the interrelationships among a whole host of sophisticated concepts. The patterns and relationships among these concepts