

# Using Writing Assignments in Teaching Mathematics to Non-Science Majors

Mike McConnell  
Department of Mathematics  
Clarion University  
Clarion, PA 16214

Writing across the curriculum has become a "hot topic" in education, even showing up in an area some people think farthest from language--the math classroom. Despite this view, there are many advantages to using writing assignments in teaching math, once the teacher and the students get past the initial stages.

Mathematics and language are vitally connected. In the "real world", math is useless if the results cannot be understood and communicated. The medium of this understanding is language. In the classroom this means that math students don't understand new concepts until they can verbalize them and they will often learn new concepts more quickly when they express them in writing. Writing about mathematical concepts also allows students to see math as logical and interconnected, rather than as a collection of discrete factoids to be memorized.

In addition, writing assignments give instructors important feedback on how well their students understand new ideas. The assignments can not only show what topics the students are having trouble with, but also point out what types of misconceptions the students have.

Instructors who want incorporate writing assignments in their classes face a few questions.

## What do I assign?

Writing assignments can be short and simple, or long and drawn out. I believe in starting simple. A good way to start is to pick a basically straightforward concept that is often misunderstood and ask the students to explain it. For example, in a basic algebra course the students could be asked to explain why  $(x+y)^2$  is not equal to  $x^2+y^2$ . In a calculus class they could be asked to explain why a function is increasing when its derivative is positive. You can think about similar concepts for each course you are teaching. Student responses will be varied, sometimes surprising, but the act of thinking and writing about the topic helps the student internalize the concept. These assignments can be given as homework or used for in-class writing.

The write-ups for the assignments don't need to be long. Often a paragraph or two will suffice. Then, as the students (and the instructor) become more comfortable with writing assignments, longer, more complicated assignments can be made.

### How do I get math students to accept writing assignments?

My responses to the question "Why do we have to write in a math class?" vary, depending on how the students ask the question. I usually start by telling them that this is the price they pay for having a former English teacher teaching their math class. If they are asking merely for the sake of complaining, this often suffices. If their question is serious, I explain the importance of writing to learn and the importance of being able to communicate what they have learned. In general, I have found that when I give assignments that are timely to the topics covered in class, the students accept them easily.

### How do I grade their writing?

This is an important question. As one instructor said, "I'm not an English teacher, how can I grade their writing?" My response, especially to those initially getting started, is "don't." This response can be taken two ways, and I'll discuss both.

First, you don't have to grade writing assignments at all. Give them short in-class assignments, collect them, read them, and even comment on them, but don't grade them. These assignments could also be used to generate classroom discussion.

Second, grade the assignments, but don't grade the "English," grade the mathematics. If you don't feel comfortable marking grammar, punctuation, or spelling, don't. Look instead at the mathematical thought. Give the students comments (and grades) on whether or not the writing makes sense. If there are computations, are they correct? Do the students use mathematical terminology properly? Are they really explaining what they say they are? In general, I have found that when a student understands the topic and has something to say, the grammar seems to take care of itself.

One approach to the actual scoring of writing assignments is to come up with a checklist of important aspects of the assignment and give each one a point score of 0-5 (or some similar range). For example, you could use the following checklist:

#### **MATHEMATICAL**

uses mathematical terminology correctly:	0-4
computations are correct:	0-4
stays to the assigned topic:	0-3
answers the question completely:	0-5
mathematical explanation is clear:	0-5
uses specific examples to illustrate ideas:	0-3

#### **STRUCTURAL**

spelling and punctuation are correct:	0-2
uses complete sentences:	0-3
organizes the writing in paragraphs:	0-3

Items can easily be added or deleted from the list, and the point scores for each item can be varied. The main point is that the checklist gives

the you a framework for assigning points. In addition, you can pass out the checklist to the students with the assignment. This gives them a clearer idea of what you consider to be important. Handing back the assignment with a scored checklist tells the students which areas they need to improve.

I think the main idea is to get started, but to start simple. Keep in mind that you don't have to grade every aspect of their writing, or even grade their writing at all. After all, the main purpose, from a math teacher's view point, is to teach math. The reason for using writing assignments, therefore, is to teach math better.

