



# Show-Me

The "Official" Newsletter of Literacy in Missouri

DECEMBER 2010

ISSUE NO. 181

Literacy...

## Changing the Way We Teach Math

A MANUAL FOR TEACHING BASIC MATH TO ADULTS

By Kate Nonesuch

### Emotions and Math

"But I'm not a therapist...I'm a math teacher!" I can hear you say it. And you are right. Nonetheless, whether you are a therapist or not, the emotions in your math class are not going away. So how can a math teacher who is not a therapist deal with emotions? First of all, you don't have to be a therapist, just a human, to deal with your own emotions. Do that first.

However, to deal with the emotions in your students, enlist all the help you need. Other people in your program may be very useful in this case—a counselor, or someone who teaches study skills, or does student support, for example. Ask one of them to do a session with your class on any one of the following topics, and, since you're bringing them to the math class, ask them to put a "math spin" on their presentation:

- . Positive "self talk"
- . Stress management
- . Maintaining a positive relationship with your instructor
- . Becoming a successful student
- . Test anxiety

It's important that you attend the sessions as well. Your presence sends the message that you think the material is important to the math course; that you respect the person giving the presentation; that you want to hear what your students have to say during the session; that you believe there will be a carry-over into the math classes and you want to be part of the carry-over. Your absence sends the opposite message.

**"They have a story about math locked in their hearts." — Carolyn Bowles, Faculty of Education, Malaspina University-College**

## Expressing Feelings

An important strand of my teaching philosophy is to deal with emotions, my own and the students', so they don't get in the way of the learning. This comes partly from my training as a Life Skills Coach (Saskatchewan NewStart Model). My coach trainer, Audrey Adilman, used to say that it will probably take less than a minute to acknowledge the emotions that come up in the moment; that if you leave it for an hour, it might take two minutes to deal with them; if you leave it until the next day it might take half an hour, and if you leave it for longer, who knows how long it will take? How does expressing our feelings help? It helps us keep control of our emotions, helps us identify problems, and helps us maintain clarity in our relationships with other people.

According to the Life Skills lesson on expressing feelings (*Core lessons for life skills programs*, 2004), saying "I'm frustrated" or "I'm mad" or "I'm happy," releases the hold the emotion has on you a little, so that you can concentrate on other things, and think and act rather than just emote. Maintaining control over emotions is helpful in the classroom where so many people are working in a public space. Certainly as an instructor, I'm happy when people can control their emotions so I don't have to control the people. I'd much rather someone say, "I'm really frustrated when I keep getting these questions wrong," instead of slamming his books down and stamping out, swearing under his breath, or out loud. Furthermore, a student who can say what is bothering him may be able to go on working, or ask for help, or use some strategy he has for dealing with stress or anger.

Sometimes a problem shows itself first in a feeling—we notice our muscles are tense, or our palms are sweaty, before we can articulate what is wrong. Paying attention to feelings can help us identify problems: "Every time you mention denominators, the pit of my stomach falls out." "Whenever you lean over to look at my work, I stop breathing." Such feelings help pinpoint a problem, and identifying a problem is the first step in solving it.

Expressing a feeling, and owning it as our own, helps maintain clear relationships with others. If I am worried, but don't say so, the worry may look like anger to someone else—withdrawal, blank stare, drawn-in shoulders, silence, holding my breath. If a student looks at those behaviors and assumes I'm angry, suddenly I have two problems—the thing I was originally worried about and a relationship with a student that needs to be repaired. If I can say, "I'm worried because I'm not sure if we can get this whole activity finished in the time we've got left, and it won't be good to leave it half done until Monday," then the student is clear that I'm not angry at him, and I have only one problem to deal with—a scheduling problem, not a relationship problem.

If you are uncomfortable dealing with students' emotions, or with encouraging them to express their emotions, keep in mind that the emotions are still there, even if everyone is ignoring them. It may help if you acknowledge possible feelings to the class, without singling out any particular person. For example, you might say, "I can see some of you look puzzled right now. If you are feeling confused, hang on. I think the next activity will help sort things out." If a student is able to say, "I'm confused right now," the expression of the feeling releases it, and leaves a calmer space for paying attention to your assurances that help is at hand. If you express out loud your awareness that some people may be confused, you may accomplish the same thing for some students. On the other hand, if you notice the puzzled looks, and go on to a new explanation or to the next activity, without acknowledging the confusion, the students who are dealing with the emotion will not be able to give their full attention to the activity that you hope will clarify the confusion. Expressing the feeling helps the situation, no matter who does the expressing. Students who would be unwilling or unable to express their confusion may also be served by your acknowledgement of it. You will see smiles and nods to confirm your expression.

In the following sections, I'll talk about how some emotions might be expressed in the class and some ways of dealing with them when they show up.

## ***Joy***

***I'm happy. I'm having fun. I'm enjoying myself. I'm excited about this. I love math.***

I look for joy in my teaching. Why else do it? In teaching math, there is both the pleasure of math to be looked for, and the pleasure of teaching. In learning math, there is the pleasure of math to look for, and the pleasure of learning. The pleasure of math is a pleasure that both teacher and student can share; the pleasure of finding a pattern, or figuring out three ways to show that  $\frac{1}{8}$  equals 12.5%, seems to be pretty much equal between me and a student. The student has the joy of discovery, and for me, the pleasure of the patterns does not seem to diminish, and I have the additional satisfaction of witnessing the student's joy. The pleasure of teaching and the pleasure of learning often happen at the same time—it's that moment when someone says, "Aha!"

## ***Confidence***

***I think I can. I'm going to give it a try. I know I can figure this out.***

As teachers, we often have the mindset to see where students have gone wrong, to find the errors. This is a useful mindset to the instructor—it helps us figure out what to review, to notice how one way of explaining is more useful than another, to notice patterns of errors, and so on—but it is not useful to the student. The mindset of seeing errors improves teaching and learning when I keep the information to myself. When I say it out loud, it decreases confidence in students who hear it. It is confidence that allows students to make decisions in math, to decide how to tackle a problem, to believe they can tackle a problem. If they have no confidence, they will take no risks. To believe they can do math in the present or the future, they have to believe they have been able to do it in the past. In encouraging this belief, it is more useful to the student if the instructor is ready to notice and comment on what they have done right, rather than what they have done wrong. Part of that mindset is to cultivate the habit of cutting math problems into small pieces, so that the small parts they did correctly can shine out, and you can acknowledge them. Students are aware of how you respond to other students. Responding positively to one student may prompt another to take a risk, anticipating that your response will be similar to the one he has witnessed.

## ***Marking in a positive way***

Ideally, I would mark each question as the student does it. When students start to work on a page in their books, or on a sheet I have given them, I don't wait for them to finish and hand it in, rather I move around immediately, marking each one as I go, then coming back when they have a few more questions done. When I find several people having the same difficulty, I can call the class together, apologize for not having been clear enough in my explanations, and go over it again.

When I am working one-on-one to mark a student's work, my job is to be encouraging by pointing out what the student has done correctly, and what evidence I see of good math thinking. My job is also to give the student a chance to articulate what she is doing, to help her remember, and to give her control over the process.

When I look at a page with the student, first, I put a checkmark beside every correct answer. I ignore the ones that are wrong, and comment that the student got some/many correct.

If there are only a few wrong, I start with the first one that is correct. I ask the student to tell me how she did it, so she has a chance to “rehearse” the procedure and articulate it clearly. I repeat with the next correct one, and the next, until she can easily articulate the procedure. Then I move to the first one that was wrong, and again ask the student to explain what she did. Usually, she will find her mistake and correct it on her own. I mark it right, and praise her for being able to find her own errors without me pointing them out. I continue with the next one wrong; at some point, I can ask her to independently check all the ones that don’t have a checkmark beside them.

If more than a few questions are wrong, I find the first one that is right, mark it right, and ask the student if I can guess what she did. I go over the question, teaching and dialoguing with the student about the method. I try to figure out where the student’s error is coming from. I then present a new question to the student and ask her to do it while I watch/coach. Then another. When I am sure the student has the process in mind, I offer a clean copy of the worksheet to do, or a new worksheet with similar problems.

I take my share of the responsibility for asking the student to do something she was not prepared for, so she knows that her mistakes were part of a complex process that involve my explanations, her ability to attend to them, time pressures, her previous knowledge, my knowledge of her math level, and emotional factors.

## ***Fear***

***I’m scared. I’m anxious. I’m worried. I hate math. I’m stressed out.***

Fight, flight, or freeze. I’ve learned to recognize all these responses by math students, and gone on from there to take it less personally when students attack me or run from me or disengage. I know it’s not so much me they are reacting to, but to the situation itself.

For some years I would go around the class, asking, “How are you doing? Do you need any help?” and students would say, “Okay,” or “No.” Usually they kept their work hidden when they answered this way, but often I would find out later that indeed they did need help—they weren’t doing okay at all. Yet they shut me out by saying, “I’m okay.” Why do they lie? Because they are running away from whatever mini-lesson I might give them if they admitted they needed help. Because they are running away from the panic they would feel if they worked on math with the teacher.

Sometimes I would invite people to come to see me outside class time to get some extra help, and the answer might be, “No thanks, I’ll work with my tutor (or my father or my girlfriend or...).” But I would hear from the tutor that they didn’t show up for a scheduled tutoring session, and I would see no evidence that the alleged sessions with family members bore any fruit. Why would a student invent math learning at some other time? Because they are running away from my math lesson and from panic.

For a while I took it personally, all this running away, but eventually I learned some tactics for heading it off. I no longer ask, “Do you need any help?” Instead I say, “What question are you working on? What can you tell me about your thinking about that question?” or “You don’t look happy. What’s getting you down?” The student can still avoid me if he wants to, but I don’t make it easy for him. If the student is not struggling, this technique invites the student to articulate their math thinking.

Many students who have been dealing with fear of math for a long time have developed a defensive fall-back position, which expresses itself as “I’m no good at math (so I don’t have to try)” or “I can’t do tests (so don’t ask me to).” Another fallback position is to blame the teacher. More situations for me to practice not taking things personally!

## *Anxiety*

“Anxiety results when you are required to stay in an uncomfortable situation where you believe you have no control,” according to Cheryl Ooten (2003) in *Managing the Mean Math Blues*. How can an instructor help a student take control? See Chapter 7 of this manual, and, in the meantime, since we are talking about emotions, there are some things you can do.

First, acknowledge the anxiety. Talk about the anxieties you have about your own performance in class, for example, first day jitters, worries that you will forget people’s names, or that you will run out of material before you run out of time—whatever they are. When you acknowledge your own anxieties, you disrupt the power imbalance; you become more human. The students have a chance to be generous with you, to *give you* something rather than always being on the receiving end. They can offer to help you remember names, or cut you some slack if your worries come true. (I’m not suggesting that you rely on students to meet your needs for reassurance and support, just saying that an acknowledgement of your own humanity builds a relationship of mutual respect.) Admitting your own anxiety starts the modeling of what you would like the students to do—if the teacher can admit she is anxious about goofing up, then maybe the anxious student can do so, too. If that happens, you have some information about your students and their areas of need.

### **Strategies**

Talk about the way stress shows itself in the body. Strategize with the students some ways to deal with stress. They will have some good suggestions, especially if they have had experience in life skills, anger management, or Alcoholics Anonymous. Ask someone to come into the class to teach a few methods of dealing with stress so that students can choose something that works for them; learn them yourself, and model them by using them with the students. Share your own methods. (Mine is square breathing.)

### **Square Breathing**

Get ready to start square breathing by taking a deep breath and releasing it. There are four steps in each set: inhale, hold, exhale, and hold. Give an equal length of time to each step. Concentrate on counting and breathing. Count four for each step:

- Breathe in, two, three, four
- Hold, two, three, four
- Breathe out, two, three, four
- Hold, two, three, four

Repeat several times.

Above all, make it clear that you expect, welcome, and allow students to use these methods in class. For example, if one strategy is to walk around the block, you will not call attention to someone who gets up in the middle of class to do that—and you will be happy to see him return to class 10 minutes later. Such stress-reducing activities as leaving the room or walking over to the window to look at the trees or the sky are not customary in classrooms, and students will need to be reassured that you mean it when you ask them to use some strategies for relieving stress, strategies which often require movement of some kind.

## ***Test Anxiety***

***I understand it in class, and I get my homework right, and on the test I freeze.***

***I forgot my name. My blood froze. I could feel it running through my veins with little ice cubes in it. I could feel the little ice cubes bumping along.***

***I remembered how to do it as soon as I walked out of the test room.***

What can a teacher do to reduce test anxiety? Here are some suggestions:

***No surprises:*** Make a deal with your students that there will be no surprises on the test. If you use a pretest, it will look like the real test; if you say what kind of questions will be on the test, those questions will be there, in the shape and form they expect. There will be no surprises with the language. If you use the term “reduce” in class, then the test will say “Reduce these fractions” not “Write in lowest terms.” If you ask in class, “What is the value of  $x$ ?” the test will say just that, not “Evaluate.”

***Teach test strategies:*** Ask someone to come to class to give a session on studying for and writing tests, or give a session yourself. One strategy I learned in such a session is that when you are studying for a test, you do what the test will ask you to do. So when studying for a math test, you do examples of the kinds of problems that will be on the test. You don’t study for a math test by reading your text or watching someone else do math, because the test will not ask you to read about math or watch someone do it. The test will ask you to do math so you study by doing math!

***Encourage students to ask questions during the test:*** This practice has saved me many times, after I’ve let a typo get through without noticing it, or a dirty photocopier has put in a decimal that I didn’t mean to be there. After the first student notices my mistake and asks me about it, I can correct it for everybody. Of course, I don’t want to help people do the math on a test—that is their job. However, I want them to be able to show what math they can do, and if they don’t understand my instructions, or find an impossible question, I want to clear up the misunderstanding so they can go ahead and do the math.

***Offer students a chance to do the test privately:*** Karen Burns reports that at such private test sessions, she begins by reading each question to the student, and then writes down what the student tells her to write. Later she reads the question and the student takes over the writing; she lets this happen on the student’s schedule. Soon, she says, the student says s/he no longer needs to do tests privately. In her experience, most students say they want to take tests in the usual way after only one or two private writings, although one student needed to take four tests privately in this manner.

## ***Boredom***

***I’m bored. I’m tired of this. I feel blah!***

I have a rule in my class, that I follow myself: Refuse to be bored. I find it very useful to encourage students to say when they are bored, and to refuse to be bored in math class. The rule introduces something new. Generally, they expect to be bored in math class; for many, a mix of fear and boredom is exactly their experience of math class. So, when I ask them to commit to saying it out loud when they are bored, and suggest that math class should be exciting, or at least interesting, I have changed their expectations.

What happens after the student says he's bored? Again, the way the teacher takes this feedback is important. Sometimes the temptation to retaliate is great. When someone says it's too easy, the temptation is to leap up six levels and give him something really hard! After all, he messed up your lesson plan, so you want to mess up his. If I can take this feedback less personally, I can begin a conversation about what makes the material boring. A bored student is a disengaged student, but a student who says he is bored gives you an entryway into dealing with some math difficulties, and into re-engaging the student. I try to find out if the student is bored because it is too hard. (I know from personal experience that frustration gets boring very quickly.) Is she bored because it is too easy? Because he doesn't see the point of this particular thing? Because they've done it all before, and nothing seems different this time around? Whatever the reason, it is sometimes easier for a student to admit to being bored than to admit to being scared or frustrated.

## ***Anger***

### ***I'm frustrated; I'm irritated; I'm mad.***

I like to say when I'm irritated or frustrated, or mad, for two reasons. First, saying it helps me calm down a little. Second, it gives me a chance to make it clear what I'm frustrated about. Even if I don't say anything, the students know I'm irritated about something—the emotion leaks out in my voice or my body language, and they are past masters at reading voice and body language of teachers. They often assume the worst—that I'm mad at them because they are stupid. Saying what I'm frustrated about is useful to them as well.

For example, I might say, "I'm feeling frustrated with myself. You and I have been working really hard on this, and I can't seem to find an example or an explanation that will help. My brain seems to have frozen solid. Can you let me think about it overnight, and maybe I can come up with something that will be useful to both of us." (Here I make it clear that I'm frustrated *with myself*, not with the student. The student gets to see that I'm human, that teaching is work, and also gets a chance to be generous with me by giving me some time to come up with something new.)

or:

"I'm frustrated when you miss so many classes. It's hard for me to help you catch up, and I worry that even if you do catch up today, you might not come tomorrow, and then the next day we'll be back at square one. That makes things hard for you, and it makes my job harder too." (Here it is clear that the attendance is the problem, not that the student is stupid. It seems to me that it is easier to come to some solution about lack of attendance than to cure stupidity. It also makes it clear that his absences have an effect on me, that I want him to attend regularly not "for his own good," but because it makes my job easier and more fulfilling.)

Students also get angry in math class, and often they direct their anger at the instructor. "You don't like brown people." "You only work with the pretty girls." "You don't care about people who've been out of school a long time." "You don't understand youth." "You don't..." Students lash out, and it hurts, and your own emotion interferes with your ability to teach that moment or that student. Once again, this is a place to acknowledge my feelings, figure out where the student's anger is coming from, and go on from there.

## ***Humiliation***

### ***I feel like I'm in kindergarten.***

Often students haven't done many participatory activities since they were in early elementary school. I hear many reports that my students were so far behind in school that they didn't work with the rest of the class, rather worked alone in a workbook that the teacher marked and gave back to them. So when I ask them to use manipulatives, for example, I know they sometimes start by feeling humiliated, because in their experience,

For example, I know they sometimes start by feeling humiliated, because in their experience, manipulatives are for babies.

I know that a student whose mind and heart is occupied with feeling humiliated and resentful about using the manipulatives will not see that  $2/6 = 1/3$ , and since my interest is in exactly that, I'll do something to help express the feelings, so we can both get on with the job we came to do. I am happy to hear people express their own feelings without prompting, but if a student is not expressing anything, just sitting with hands in pocket, I may make a stab at identifying the emotions. I might say, "When I first started using these I felt clumsy with all these little pieces," or "Sometimes students tell me that the blocks are just for kids, and they feel silly using them." That is often enough to open the way to the student expressing the feelings, and once that is done, a rational decision can be made about if and how the manipulatives will be used.

For those who like manipulatives, it is play, and I feel child-like, not childish, when I use them. So I like to let my enjoyment of manipulative play show, and encourage students to have fun, too, but I am careful to call the manipulatives themselves "math tools" and not "math toys," which is how I think of them privately.

## Trauma and Learning Math

*I'm not allowed to have opinions. I don't have any opinions worth expressing.*

I know from my reading, [for example, *Too Scared to Learn* (Horsman, 1999), and *Violence and Learning: Taking Action* (Norton, 2004)], and from my experience, that students who have experienced violence may space out or act out in class, no matter how motivated they are to learn math. Particularly I notice how difficult it is for many of them to share an opinion or make a decision. Expressing an opinion has been dangerous in the past, and it is not possible to do math while avoiding expressing an opinion about how to solve a problem. Making the classroom a safe place to take risks is an art. When you involve the whole class in figuring out how to make it safe for everyone, you show your commitment to safety and offer a chance for students to say what they need to be safe.

Making the classroom safe for the many students who are survivors of trauma is beyond the scope of this manual. Jenny Horsman, Mary Norton and others have written extensively about the relationship between violence and learning, and much of their material is on line at [www.nald.ca](http://www.nald.ca). An exciting new website being developed by Jenny Horsman is at [www.learningandviolence.net](http://www.learningandviolence.net).