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A Hypnotist Teaches Math: The Effect of Person Centered Math Support Classes on At-Risk Community College Students

Ron Bell
Person Centered Mathematics

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Ron Bell, M.C., M.F.A.
Person Centered Mathematics
10424 N. 8th Ave.
Phoenix, AZ 85021
ronbell@aztec.asu.edu
http://members.tripod.com/~ronbell/index.html

ABSTRACT
The same elements which make Ericksonian hypnosis a highly effective therapeutic tool are found to be at work in an algebra support class called Math Success Orientation. Interpersonal dynamics of Carl Rogers' person centered approach to counseling are also part of the philosophy of the class which has a four semester track record of improving both grades and attitude in at risk, math avoidant community college students. The article relates the history of the course with illustrations of how the elements of Person Centered Mathematics operate in the classroom. An appendix demonstrates the effect of the class on student grades...

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Four semesters ago, in the spring of 1996, I was asked to supervise four tutors who would be working with math avoidant college students as part of the Achieving a College Education Plus (ACE Plus) assistance program for first generation college students. To entice these math avoidant, math anxious, math hating—though otherwise ordinary—college students to give math another try, the experience was termed a college course with transferable credit, to be taught by a counselor, not a math instructor. Grading for *CPD 150 Math Success Orientation (MSO)* would be based solely on attendance.

Feeling a responsibility to provide a legitimate course of instruction, I developed a curriculum which cut into the available time for tutoring while providing study skills, logic training and strategies for dealing with math anxiety. Four semesters later, as I reflect on how our students are outperforming the rest of the student body, how MSO has been picked up by the math department, expanded from one to eight sections and now includes a second course in tutoring methodology, it is clear to me that what makes the course work is not the curriculum or the amount of tutoring but an underlying philosophy which combines the person centered therapy of Carl Rogers with a framework for hypnotherapy developed out of the work of Milton Erickson. In this article, I will describe several Ericksonian concepts and just a few Rogerian ways of being with people which have combined to form what I call *Person Centered Mathematics (PCM).*

So far, I've identified 14 distinct Ericksonian elements at work in my teaching. They include *utilization, chunking down, priming, paradox, pacing, absorption, reframing, response sets, shock, confusion, indirection, metaphor, ordeal of choices,* and *linking*.

I need to clarify that while my methods reflect the practices of Ericksonian hypnotherapy, I do not hypnotize my students. What I've come to realize is that the same use of communication and relationship building which allows a hypnotic subject to relax, focus and enter an enhanced psychological state called trance, can be employed to facilitate students to relax in the face of math anxiety, focus on mathematical concepts and enter an enhanced psychological state called learning. Additionally, the same unconditional positive regard which Carl Roger used so effectively to promote personal growth in his clients is vital to the educational growth of students who have established a failure identity in mathematics.

Milton Erickson emphasized the importance of the relationship between hypnotist and subject, between teacher and student. He respected the leamer's ability to make choices and made it the instructor's job to uncover more choices, not to decide for the learner. Erickson saw each student as a distinct individual with

a unique internal logic responding to one's own positive intentions. He sought to develop rapport, create an atmosphere in which students internal resources could be utilized to move them toward their goals. Significantly, he did not believe in *resistance*.

CLASS BEGINS

The first day of MSO was marked by student resistance to trying anything new involving mathematics. I'd taught non-math courses to students from ACE Plus previously and always found them open to experimentation and risk taking. So it surprised me when I could not find a volunteer to come to the chalkboard to work a problem.

I decided to view their behavior as positively motivated. Erickson believed that what we call resistance is actually an individual's own internally logical method of meeting personal needs. I searched for a way to utilize their reluctance to expose themselves to chalkboard failure. On a hunch, I asked them all to go to the chalkboard and work the problem in pairs. Within moments they were all scribbling away; "resistance" had disappeared.

In retrospect, it appears that their fear had been of being singled out. My instruction reframed the situation to one in which the feared condition—exposure—could only be avoided by doing what I asked. Mirroring the mechanism of a hypnotic suggestion, my instruction could easily have been ignored had it been inappropriate but was just as easily followed, having become a comparatively attractive option to be singled out back at one's desk as the sole non-participant.

UTILIZATION

Erickson was uncanny in his ability to take what the client was doing to sustain the problem and use the same mechanism to resolve it. He called this *utilization*. In the example above, I utilized students' strong motivation to avoid being singled out as impetus to "join the crowd" at the chalkboard. Another example involved an older woman, newly divorced, feeling out of place in a class full of eighteen year olds; she was hesitant to accept peer tutoring. Out of class she proudly described raising her three children who are now in successful careers. Utilizing the importance she placed on her pride and mothering, I got her talking about how she developed her own kids confidence by letting them gradually accept greater challenges and increased responsibility. She then readily accepted the idea that by allowing these youngsters to tutor her, she was giving them similar nurturing, validating experiences—a nice trade off. She now proudly refers to herself not as a helpless tutee but as "co-trainer of tutors."

CHUNKING DOWN, PRIMING AND PARADOX

I later discovered that a gradual building up of small successes worked even better. First trips to the chalkboard would always be in groups. The task would move imperceptibly from simple to complex, from drawing to writing, from silly to serious. A typical student reaction was to remark later in the semester how he or she had always hated going to the chalkboard and could not remember when it had become so easy. The Ericksonian concept at work here was that of *chunking down*, breaking a seemingly impossible task into its component parts, "the idea that Custer could have won if the Indians had come over the hill one at a time" (Lankton & Lankton).

Seeing how quickly the atmosphere in the room had changed, I began to think in terms of *priming*, an Ericksonian concept having to do with building a foundation of ideas which encourage the client to start thinking in a particular direction so that later ideas will have a place to nest...

In MSO, priming involved not only keeping students informed of what was to come, but guiding and shaping their reactions. I seeded the idea that success involved being open to new experience, that success would sneak up on students, that success did not require perfection, that allowing math to be fun would dissipate anxiety and allow comprehension to flourish, that math was an interpersonal experience, that tutoring a peer was the best way for the tutoring peer to learn.

A paradoxical form of priming involves "predicting a relapse." After a new group of students begins to settle into the course, I make the following statement, "While many of you will experience failure early on, as your attitude gradually changes, you'll begin to see impressive improvement." This statement involves several Ericksonian concepts which will be examined in more detail.

The statement begins with a truism; these students

have traditionally failed at math. By saying so, I am only validating their current experience. The wording is purposely vague. Who is and who isn't part of *many of you*? In what context will they *experience failure*? On a quiz? A test? When does *early on* begin and end? Vague wording improves the chance they will accept what I'm saying without challenge.

The second part of the statement links *failure* to *improvement* through the unspecified idea of *attitude change*. Which *attitude* will *change*? How fast or slow is *gradual*? After being validated by the first premise, *you will experience failure early on*, it becomes easier to accept the last part, *you'll begin to experience impressive improvement*. This imprecise wording allows each student to imagine what would constitute impressive improvement.

The result is that students are put in the unique position of seeing failure as a harbinger of good things to come. They are less likely to panic or become discouraged by a poor test result. When spoken congruently and sincerely, these kinds of statements result in sustained motivation which ultimately translates into better grades.

NO SUCH THING AS RESISTANCE

The clients of Carl Rogers drew strength from his unwavering belief in them. My tutors and I were continually challenged to stay future focused, believing in each student's potential. In a meeting with the instructor, a tutor referred to a student as a slacker who didn't do his homework and didn't care. After this student was switched to a tutor who believed in the student, he went from F's to B's. Whereas the first tutor knew her math, was creative and energetic, her replacement refused to view him as resistant or not trying. Her belief in him translated into his own success.

PCM joins Erickson in rejecting the idea of resistance because if students can resist, so can instructors. It is too easy for an instructor to think, "They obviously don't care, so why should I go the extra mile?" Instructors who view their students as resistant can become resentful or feel hopeless of reaching them. Students pick up on their instructors' attitudes, their "vibes." Whether or not these attitudes are verbalized, students get the message. They feel blamed, alienated, and unheard. They then view their instructors as "resistant," and the cycle continues with both sides putting in less and less effort.

PACING AND ABSORPTION

Rather than think in terms of reducing resistance, Erickson focused on *pacing* his clients. We want our students to be "on the same page" with us. Erickson recognized that before clients would turn to the therapeutic page, he first had to visit theirs. He sought to get into their rhythms. In trance induction, this meant speaking in rhythm to the subject's breathing. Rather than repeat some stock patter, Erickson absorbed attention by talking on topics known to be of interest to the individual. As rapport was being gained, he would ease into therapy. In MSO, this means that in every class period I present a meaningful transition to thinking and doing math.

A few students are ready from the get go. But for most, social needs must be met and interest gained. Tutors are encouraged to identify those students who have greater social needs, requiring a few moments to chat before getting down to business. Rather than see this as a waste, i.e., "Yak on your own time; I'm here to teach," we view it as an opportunity to take the pulse of the class, check out who needs what. Ideally, the transition to instruction occurs unnoticed. I'll present a brainteaser or tell a math joke designed to illustrate a way of breaking out of old patterns and discovering some alternative mode of thinking about math.

As an example, in math notation, shortcuts tend to confuse some students. Although they've been exposed to the same notation for years, under pressure they see the term 5t, and think "five t," not "five times t." They read 3/y as "three over y," not "three divided by y." They read 7(q) as "seven parenthesis q," not "seven times q." I call these unwritten operations *ghosts*. To create a memory trace which will always remind them to see the ghosts, I ask them the following riddle. As time permits, I dress up the story into a real drama. But in brief,

> A man and his wife are rushing back to town when they crash. He's thrown from the car but she's trapped inside. He rushes for help, but when he returns, she's dead and a stranger is in the car. The doors and windows are still intact and unopenable. Firemen have to break in to get them out. How did she die, and who

is the stranger? (*The answer is at the end of this article.*)

Usually after a few minutes of wrong guesses and clues, someone comes up with the right answer. I'll then remark on the resemblance of parenthesis to the woman's condition. We'll generate a list of mathematical ghosts. In future tutoring situations, I need only ask, "Do you see a ghost?"

In Ericksonian terms, the puzzle has playfully absorbed their attention. The answer is a surprise which heightens their arousal, creating a psychological space in which interest, attention and motivation are increased so that my next suggestion is accepted and comprehended without interference, i.e., they forget for a moment that math is hard and instead simply enjoy learning about mathematical ghosts—and they're now ready for an hour of algebra.

If we buy into the paradigm that they MUST PASS MATH NOW!, we've lost before we've begun.

These kinds of lessons gradually change students' attitudes towards math from disdain to enjoyment, from terror to confidence. On the very first day of MSO, I had the students describe their individual math histories. While this gave us a lot of important information and let them know they were all in the same boat, the general impression was that ship was sinking; they had neither oars nor life jackets. They hated math and didn't believe they could ever succeed. Our challenge was to convince them that they could, without dismissing their feelings.

ATTITUDE AND VALIDATION

There is an art to validating a student's experience without getting mired in it. Elizabeth Ely, director of the Field School where I cut my eye teeth on teaching, was fond of quoting an aphorism of Pythagoras, "Help a man to take up his burden, but never help him put it down." She cares deeply for her students' struggles but never lets them quit. Carl Rogers would listen with complete absorption as his clients bared their deepest pains. He didn't insult them with quick fixes. Clients felt his empathy but also his belief in them. Milton Erickson kept the client focused on solutions, not problems; on future possibilities, not the injustices of the past.

After twelve or more years of struggle, my students were spoiling for a fight, tensed for the next blow. Our objective was to make sure that blow never came from our camp. Like a tennis player who leaps the net and takes a doubles stance, we refused to see our students as the opponent, no matter how many volleys they sent our way.

In practice, this meant no blaming, no cajoling, no threatening, no "I told you so's." From time to time, I would remind a student of where he or she stood in relation to the attendance/grading policy, then step back and respect whatever choice the student made. Occasionally a student would pile up enough absences to assure a failing grade. Typically that student would return the next semester both acknowledging that some personal issues had taken precedence over math, and thanking us for the space given.

A LEAP OF FAITH

In the third installment of the Indiana Jones saga, in order to save his father's life, our hero must step off a ledge above a deep canyon and walk through the air to a cave on the far side, hoping against hope that he won't fall into the chasm below. He makes the leap of faith, drops onto a camouflaged bridge which he crosses easily, and ultimately saves both his father and the day.

Developing Person Centered Mathematics required a similar leap of faith. We let go of the idea of grades. Not only do we not grade on math proficiency, we don't worry about what grades students get on their early math tests. Simply put, if we panic, they panic. If we buy into the paradigm that they MUST PASS MATH NOW!, we've lost before we've begun. In that case we'd be giving them exactly what they've had before, what they're used to, what they've continually failed with. To that end, and to quote from Monty Python, our motto has become, "And now for something completely different."

Students must perceive that they're not doing the same old, same old. They know the end of that story. To believe that a new result is possible, they must perceive new ways of doing things. To that end, we make

a conscious effort to do things that just don't happen in traditional classrooms, like solve murder mysteries, memorize to rap, hand out awards, eat donuts, give back rubs, crumple paper and play catch.

REFRAMES AND RESPONSE SETS

I learned to toss paper from Bill Hammers, an amazing mathematician who has an outstanding rate of students completing and passing his courses. After everyone has caught and tossed our makeshift football we ask, "How did you know at what velocity to throw the ball? How did you detennine the angle of arc which would correctly counterbalance the effect of gravity, making a successful catch a greater statistical probability?" As the students stare dumbfounded, Bill just smiles reassuringly.

For Bill, the greatest mathematician of the modem age was Joe Montana. "Imagine," Bill explains, "the trigonometry involved in hurling a football just past the outstretched arms of an all-pro cornerback into the hands of a moving receiver at a distance of sixty yards. But that's the same geometry and calculus involved in tossing a crumpled sheet of scratch paper to a peer, or judging whether you have enough room to pass on a two lane highway." Bill concludes, "You're performing operations of geometry, trigonometry and calculus all the time. All we're asking you to do in this class is algebra!"

In Ericksonian terms, Bill is setting up a *response set*. Each of his examples represents a verifiable truism. Students can't deny that to toss the paper, they had to have an intuitive sense of velocity, gravity, angles, mass and wind resistance. After agreeing with each of those ideas, they're ready to agree with the next plausible idea Bill presents, namely that algebra is relatively easy.

PARADOX, CONFUSION AND PSYCHOLOGICAL SHOCK

Erickson was fond of using *paradox, confusion* and *psychological shock* to open students to new ideas, to shake them free of rigid and limiting mind sets. I use paradoxical instruction to change the way students look at their math books. These texts are filled with useful resources, yet students typically open them only to copy down assigned problems. From a local used book store I purchase a dozen assorted, out-of-print texts for about $2 each. After putting students in small groups, I give the following instruction: "Find a glossary of terms and bring it to me. Do not bring up the book." After a few confused looks, the question is inevitably asked, "How can we bring it to you without the book?" I give them a reassuring look and repeat the instruction. Inevitably, yet tentatively, a tearing sound is heard. Soon the room is buzzing with gasps, giggles and finally a great collective sigh as tension dissolves. Students eagerly litter my desk with every resource the text has to offer. By the end of class, they are left with little more than book covers.

As this example illustrates three Ericksonian concepts, it deserves a closer look. First there was the *paradoxical suggestion*, roughly, *bring it to me but don't bring it to me*. This instruction acts to replace the students' state of complacency with one of *confusion*. Yet my demeanor remains reassuring, not mocking or competitive. When one of them finally tears a page from the text, the rest are thrown into a state of mild *psychological shock*. Sacrilege has been committed, yet the sky does not fall. This creates a space of doubt in their belief systems. The pleasure of tearing up old math books fills that space with the new ideas like *math can be fun* and *exploring a text can be fun and informative*.

Laughter in a mathematics classroom is not an event to be taken lightly. For students whose ingrained emotional response to math is anxiety, anger and embarrassment, it is a powerful experience to laugh and think math in the same breath. On a visceral level, Ericksonians recognize that such pairing can result in a lessening of math anxiety. On a metaphoric level, tearing up math books provided a release for anger so closely associated with past math problems which, not incidentally, came from similar math books. The use of used texts is not completely a monetary decision. We are destroying the *old* ways, releasing ourselves of the power of the past—not the new.

I could just as easily have directly assigned them to look up a list of textbook resources and write down the page number to verify they'd done so. Not only would that be a dry, utilitarian exercise, but little or no memory trace would have attached.

INDIRECTION AND METAPHOR

Obviously there are times when an instructor needs to be direct and to the point. But when complacency, frustration and math anxiety inhibit the learning process, it's time to employ *indirection*. Erickson is most

fondly remembered for the stories he told, each one indirectly illustrating a particular idea he wanted a client to grasp. Some were motivational, others instructional, and others rapport building.

Metaphors provide a conveniently indirect way to bring someone to an understanding without engaging confrontation or inviting rejection. Struggling math students have experienced so many failures that many will reject any idea they recognize consciously as a new intervention. But when a student deciphers the metaphor on one's own, there is a sense of ownership which allows the student to accept the new idea as a valid option.

Erickson liked to layer his metaphors one inside another. My preference is to slip a metaphor into a logic puzzle.

> Billy and Maria were out playing when they spotted a train coming towards them. Billy ran one way and Maria ran another. Billy ran directly away from the train while Maria ran towards the speeding locomotive. Billy got run over. Maria escaped to play another day. How might one explain this curious occurrence? (*The answer is at the end of this article.*)

Before checking your answer, count how many ideas the story illustrates. First, it describes the danger of meeting a challenge head on. Second, it demonstrates how it is worse to run away. Third, it suggests a new direction to move. The beauty of the puzzle is that when they hear the answer, students must admit that it was better not to avoid the challenge. A fourth idea is that being stronger, whiter, or maler is no advantage.

Fifth, should we criticize Billy? No. Both kids acted to prolong their lives—Billy by a few seconds, Maria by 70 years. Still, Billy's intention was positive—and he ran as fast as he could—faster than Maria. Struggling math students try even harder. They just need to be pointed in the right direction. Then their hard work pays double.

Sixth, notice the phrase, *curious occurrence* at the end of the puzzle. With two little words, a gory story is reframed as an enticing enigma, i.e., what used to cause math anxiety can alternatively lead to satisfaction.

Seventh, beginning the question, *How might one...* provides an invitation rather than a command. Use of the third person singular *one* further distances the student from any threat that solving puzzles might present. It can be an enlightening experience for an instructor to tape one's instructions to students and examine the many meanings that struggling students might attach. To misquote Thoreau, "The unexamined instruction is not worth giving."

ORDEAL OF CHOICE

Erickson would never suggest that teachers sugarcoat their instructions. On the contrary, he often motivated his clients by presenting a narrowed list of choices in what became known as an *ordeal of choices*. In MSO, this consists of determining a learning objective which requires active student participation such as completing homework, practicing new skills or doing in class presentations. In my experience, the majority of struggling math students also loathe presenting for their peers. These same students are usually too passive or insecure to participate in their required math courses, where they fear looking foolish if they risk asking questions.

The ordeal of choices I present to them is to either conduct an interview with one's math instructor or do a brief presentation for the class. The crucial factor is how the options are presented. First I describe the many benefits to be gained by doing an oral presentation. Although the potential benefits are real and my manner compassionate, the description taps into a considerable amount of anxiety. By the end, students are turning several shades of green. Only then do I let them know there is an alternative, i.e., to interview one's instructor. Their collective sigh can be heard three classrooms away. I then give them easy step-by-step instructions on how to conduct the interviews which most then opt for and complete on time. After the interviews, they report back that they now ask many more questions in class. Had I presented the assignments in reverse order, many would have chosen oral presentations in order to avoid the interviews. Either way, motivated to avoid an ordeal, they are more likely to complete one of the tasks.

RELATING TO STUDENTS

Person Centered Mathematics is about relating to stu-

dents in ways that provide validation and motivation. Students often view math instructors as possessing knowledge far out of their reach. Traditional math instruction reinforces this chasm between instructor and student. At the other extreme, Carl Rogers renamed his therapy from "Client Centered" to "Person Centered" to eliminate all hierarchical distinctions. While my students are confident that I know the subject matter, they don't see me as that different from themselves. When I arrive on Halloween as a math magician, "The Wizard of Odds," I am lampooning my own position as hallowed font of all knowledge mathematical. Each semester I register for some impossible math course at a nearby university so my students can watch me struggle.

Back in MSO, I make it my goal to visit briefly with as many students as possible each class. I also try to make at least one mistake each class period. It's hard for students to get down on themselves for "stupid mistakes" when they see me making them. In the tutoring portion of each class, every available board is in use. I watch from the middle of the room although my presence is intentionally peripheral. I pitch in as needed, but whenever possible, I maneuver students into peer tutoring situations. There comes a point midsemester when the class has passed into students' hands. I can usually identify this as the day I arrive ten minutes late and no one notices.

CONCLUSION

Most colleges offer some sort of math assessment test to determine the appropriate level of study for new students. These tests do not take into account human factors that lead to math anxiety and lack of confidence. PCM bridges that gap, dissolving anxiety and increasing confidence so that students' true math potential can be realized.

PCM is not just a fun way to do algebra. All the strange and different experiences have legitimate educational objectives. They also serve to distract students from their own worst fears. No hypnotic subject has ever been able to identify the exact moment he or she entered trance. It happens precisely because the subject stops worrying whether it will. Distracted from debilitating self-doubt, students are pleasantly surprised to discover that they are actually doing and understanding mathematics. Once that attitude shift occurs, they no longer need our course. In succeeding semesters, they can create their own support systems and learning networks to complement their improved math self concepts.

ANSWERS TO RIDDLES

First Answer: His wife had delivered a baby and died of complications.

Second Answer: Billy and Maria were in a tunnel. By running away, Billy delayed by a few seconds being run over. Maria on the other hand, ran out the entrance of the tunnel, then jumped out of the way, just before the train entereed and ran down her fleeing friend.

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ADDENDUM: STATISTICAL COMPARISON OF PRE VS. POST INTERVENTION AND INTERVENTION VS. CONTROL GROUP

The Math Success Orientation class (MSO) at Glendale Community College (GCC) was designed to serve students who performed at the college level in all areas but math. Because the course proved so successful, MSO students were compared to a control group who had graduated from the same high schools in the same years and had comparable math assessment test scores. While the control group could be matched for age, gender, ethnic group, and prior math history, the students who took Math Success began as a far greater challenged math group. Whereas the control group's prior history included 52.7% already succeeding with at least C's in math courses, only 21.6% of the pre-Math Success students could say the same. The control group exceeded the pre-Math Success group in percent of A's, B's and C's.

The first chart compiles grades received by each group in all required Algebra courses taken prior to the introduction of Math Success to the campus. These courses included Introductory, Intermediate and College Algebra. The Algebra courses were taught by a variety of instructors on campus who had no connec-

tion to the MSO course. MSO students chose their Algebra courses independently and in most cases were the only MSO student in that particular class. *Grades received in the one credit MSO class are <u>not</u> included in these comparisons*. The great majority of students in both the control and Math Success group had been full-time college students for no more than two semesters prior to the intervention semester. Since the total number of classes taken is not the same for bothgroups, the percentages are the most important statistics to note.

Pre-Intervention

Math Grades prior to Semester of intervention	A	B	C	D	F	Y	W
Control Group	2	10	7	3	2	3	9
	5.6%	**27.7%**	**19.4%**	8.3%	5.6%	**8.3%**	25%
Math Success group	1	1	3	5	6	0	7
	4.3%	4.3%	13%	**21.7%**	**26.1%**	0%	**30.4%**

(numbers in bold indicate highest percentage with grade)

The next chart compares the math grades received by students during a semester in which they also took Math Success, to the grades of the control group in the same semester. Note that 58.9% of the Math Success group passed with A's, B's and C's compared to only 36.3% of controls.

Post-Intervention

Math Grades	A	B	C	D	F	Y	W
Control Group	1	4	7	4	9	0	8
	3%	12.1%	21.2%	**12.1%**	**27.3%**	0%	24.2%
Math Success	7	13	13	4	2	0	17
	12.5%	**23.2%**	**23.2%**	7.1%	3.6%	0%	**30.4%**

(numbers in bold indicate highest percentage with grade)

The third chart demonstrates that when the percentage of change is calculated for both groups, the control group grades dip while MSO students' grades rise significantly.

Percentage of Change

Math Grades	A	B	C	D	F	Y	W
Math Success Group	**+8.2%**	**+18.9%**	**+13.2%**	-14.6%	-22.5%	0%	0%
Control Group	-2.6%	-15.6%	+1.8%	**+3.8%**	**+21.7%**	-8.3%	-.8%

(numbers in bold indicate highest percentage of increase)

Since the control group's grades dipped in the post-intervention semester we had to consider whether they might represent some aberration and not be representative of their typical grades. Therefore, the fourth chart lumps together all math classes taken by the control group before and after intervention, and

compares them to the Math Success group's grades received after the intervention. Yet again, the MSO students fared significantly better.

Post-Intervention MSO vs. Control Group in All Semesters

Math Grades	A	B	C	D	F	Y	W
Control Through Spring 1997	5	16	6	8	13	3	25
	6.6%	21.1%	7.9%	**10.5%**	**17.1%**	**3.9%**	**32.9%**
During Math Success	7	13	13	4	2	0	17
	12.5%	**23.2%**	**23.2%**	7.1%	3.6%	0%	30.4%

(numbers in bold indicate highest percentage of increase)

Finally, we had to consider whether the entire control group was somehow aberrant and not representative of the pool from which it was taken. The final chart lumps together all classes taken by all students in the pool which consisted of the 182 non-ACE Plus, non-Honor students who matriculated to GCC from the same high schools in the same years, 1994 and 1995. Honor students were excluded because ACE Plus does not accept them into its programs, meaning that the MSO group contained none.

Pre-Intervention Grades

	A	B	C	D	F	Y	W
MSO (39 students)	4.3%	4.3%	13%	**21.7%**	**26.1%**	0%	**30.4%**
Pool (182 students)	**10.4%**	**22.0%**	**18.1%**	10.4%	15.4%	**2.2%**	21.4%

(numbers in bold indicate highest percentage with grade)

Post-Intervention Grades

	A	B	C	D	F	Y	W
MSO	**12.5%**	**23.2%**	**23.2%**	7.1%	3.6%	0%	30.4%
Pool	9.8%	11.1%	16.5%	12.0%	17.3%	**1.3%**	**32.3%**

(numbers in bold indicate greatest improvement)

Summary of Results

1. MSO markedly improved grades in required algebra courses.
2. Previously at-risk, low performing math students improved to a level significantly higher than their peer group.
3. Students in MSO classes improved their grades from first to second semester while their peers showed a marked drop in grades.

A FINAL NOTE

Ron Bell and colleague Dr. John Coles of Truckee Meadows Community College presented Person Centered Mathematics to the American Counseling Association at the 2000 national conference.

In the time since Bell wrote this article in 1997, he has left the community college at which the program was begun to become Counseling Faculty at Southwestern Oregon Community College. Even without Bell's constant guidance, the strong foundation of the course has enabled it to have its availability expanded to ten course sections under the name "MAT 108 Tutored Math." It is remarkable that the course has achieved transfer level, considering that the courses it is designed to support are not.