Maricopa
Center for
Learning and
Instruction

Change: Hype or Efficacy?

JOHN NELSON, EDITOR
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The more things change, the more they remain the same.
—Alphonse Karr

The ever-Whirling wheel of Change;
the which all mortal things doth sway.
—Edmund Spencer
The Faerie Queene, Bk. VII, canto 6

"Outcomes," "independent learning," "faculty as mentors," "interactive technologies," "simulation" — these concepts and many more are presenting themselves to the education community as faculty confront the current issues of student learning and cost effectiveness. It would appear, at least when one considers all of the new delivery modes and interactive technology, that *change* is indeed in the air.

If we as educators acknowledge change, we must also consider our response to it. For some, change may be welcome and invigorating; for others, it may be anathema or merely rhetoric. Regardless of how it is perceived, each of us encounter problems managing it.

Alan Guskin, our spring Convocation speaker, asserts that change is being forced on us. In his article "Restructuring the Role of Faculty," which appeared in the September/October 1994 issue of *Change Magazine*, Guskin states, "the unacceptability of student costs will drive us to change, the new technologies will challenge us to alter our practices, and the society will force us to be accountable" (25). Guskin continues his thoughts by advocating that faculty creatively embrace the change and avoid locking themselves in an "unexamined educational delivery system" (25). His final pronouncement is a restructuring of our role as faculty so that we can meet the demands of student learning.

While any "restructuring" may sound a bit grandiose, we have already seen many of these ideas successfully implemented around Maricopa. Guskin says restructuring ". . . will be to integrate the new world of simulation and interactive technologies with their [the

faculty's] own unique role as mentors, coaches, facilitators, and teachers of student learning" (23). Our writers, in this issue of the *Labyrinth/Forum* have responded to this challenge with highly unique approaches to change. All of their ideas clearly enhance student learning.

In these articles you will read about faculty who are developing curriculum that allows students to select options and enhance their capabilites of "learning in ways that make sense to them." You will find pedagogical changes which encourage the students to "become part of the process," and interactive technology in which "...students are put into an authority mode and placed in a more equal stance to the 'teacher' in the learning process." All of these changes are examples of individuals in our District who are taking charge of *change* and creatively implementing techniques that allow students to relate to the material and actually apply their knowledge and critical thinking.

Considering the theme of change, you may notice the *Labyrinth/Forum* has a new look! Our new color and design changes are provided to enhance the presentation of our articles' text, and I want to take this opportunity to thank Sathees Koopat of *Creative Graphics*. He freely gave his time and expertise to assist our efforts in producing a content-centered and attractive publication.

As the spring issue of the *Labyrinth/Forum* takes on the theme of change, our desire is to provide a medium which allows you to question and explore your relation to change. Read and use it. Most importantly, consider these ideas as a means to evaluate your role in change.

Spotlight

Our Propensity to Change Continues with the People Who Surround Us

NAOMI STORY, MCLI

Change is a constant at Maricopa. Ever since I became a Maricopan, I have been immersed in change: its processes, agendas, policies, organizations, and so forth. In fact, at various times in my life when I had to consider important career options, I always chose to avoid directions that would lead me into a strictly prescribed or traditional mindset. Maricopa has always been a place, as Parker Palmer describes in his book *The Courage to Teach*, "...where inner and outer reality flow seamlessly into each other, like the ever-merging surfaces of a Möbius strip, endlessly co-creating us and the world we inhabit."

The opportunities to learn from our colleagues and our students have been consistent for more than the decade that I have been part of Maricopa. Faculty continue to adopt new ideas from Lodestar and/or special faculty development or Ocotillo-sponsored events. Students are provided a variety of learning experiences both in and out of the classroom. For example, classroom assessment techniques, cooperative learning, and service learning are some innovations that have been infused into our students' learning experiences and faculty repertoire. Instructional technology tools are used across the District in many unique ways.

We are also in the midst of struggles with the change experience on our learning landscape. Whether influenced by internal or external factors, integrating new ideas and innovation rarely is an easy process. Sustaining learning communities models has been a challenge; Internet-based instruction that infuses active learning and student support is another. The paradox of our system, its diversity and similarities, has made change a blessing for some and a curse for others at different times in our institution's history.

However, as the ability to learn is inherent in being human, we continue to have cause for celebrating the change that learning brings everyday and everywhere, formally and informally. How do we sustain the rhythm of learning in our communities, in our selves, and in our future? How committed are and will we be to change?

Hot or cold...good or bad...long or short...change has been our reality and our expectation since the beginning of Dr. Paul A. Elsner's tenure as our District's chancellor. Some staid or more "traditional" systems may fear or distrust new ideas that come with any new learning. However, this is not the case with Maricopa; we have been vested in the spirit and soul of change. Even though many Maricopans may still wonder about what will come with our future chancellor, we are firm in our commitment to learning and student success.

Now, as we begin the search for Elsner's successor, we are about to embark on the greatest change ever. *Will the new chancellor create, negotiate, nurture, and sustain educational landscapes and learning enterprises that are diverse, fluid, and dynamic? Will this person continue the momentum for learning and innovation with which we are comfortable and we expect?*

This issue of the *Forum* reflects Dr. Elsner's spirit and legacy of change across and beyond Maricopa. Additionally, the introspective and courageous Ed Chandler (faculty), Christina Emmons (MCLI staff member), Jennifer Boonlorn and Jon Robinson (PVCC students), truly authentic mentors and learners, describe the multidimensional aspects of change's journey. Finally, the *Forum* salutes the various faculty who have discovered and experimented with risk as their new ideals expand our knowledge base and our "communities of practice."

I Can Never Go Back...

RENE DIAZ-LEFEBVRE, GCC

"The mind is a fire to be kindled, not a vessel to be filled."
-- Plutarch

A quiet revolution has been taking place in our country over the past few years. This revolution is centered around learning, intelligence, and what it means to be "smart." Over the past four or five years a proliferation of books and movies has challenged us as a society in *general* to determine and redefine "smartness."

As an academic psychologist and a practitioner/researcher, I have had an interest in and studied cognitive psychology for 15 years. I have always been intrigued with the study of problem solving, intelligence and IQ tests, learning environments, and creativity. I am a teacher first and foremost. Actually, like most "seasoned" academics -- 24years -- I have spent all my adult life "in college." I do strive for balance; my family is important to me, I'm a decent jazz drummer, and I love fishing.

If It Ain't Broken . . .

In reviewing the literature on the "learning revolution" taking place in higher education, one would think we are well on our way in preparing students for 21st century thinking and learning. One of the major flaws of this belief; IT'S NOT TRUE!

In college classrooms across the country (including Maricopa) there are too many students who are "falling through the cracks" because they don't "fit in" a paper/pencil/lecture delivery system. This nineteenth century delivery system -- based on a factory model -- sees learning as an abstract activity which is heavily dependent on the teacher, who imparts information and routine skills, aided by textbooks. Historically, this delivery system heavily emphasized linguistic, word smart intelligence or "book smart," and logical-mathematical, number, and/or "computer smart." Many of the students I speak of are "smart" and capable of learning in ways that make sense to them. It is these unorthodox and different ways of learning we must be spending our time exploring, be open to, and understand.

Over the past five years I have been involved in applying Howard Gardner's theory of multiple intelligences -- MI, (originally devoloped with children in mind) at GCC. Gardner believes all of us have the capability, talent, and potential of having eight different intelligences: (1) linguistic (words); (2) logical-mathematical (numbers); (3) spatial (picture); (4) musical (musical/rhythmic); (5) bodily-kinesthetic (movement); (6) interpersonal (people); (7) intrapersonal (self); and (8) naturalist (flora and fauna). Could this theory be applicable in a college classroom? Initially, a two-year MI Pilot Study (1994-96) was conducted incorporating MI learning options into introductory psychology classes, followed by the current 10 subject interdisciplinary MI Expansion Project.

Comfort Zones and Risk-Taking

It just wasn't working for me and my students. I had to do *something*. I could no longer rest on the belief that spending most of my teaching career lecturing and giving paper/pencil tests was the *best* way for students to learn. Could it be I wasn't teaching or reaching as many students as I thought? I was always prepared for my lectures. I even made a point to tell different "jokes." For some reason, however, they were not "getting it." They appeared uninterested, unmotivated and, yes, even *bored*. This was a hard pill to swallow.

I could have retreated into the "blame game." That is to blame society, parents, high schools, and obviously, the STUDENTS themselves for not being academically prepared and motivated to do well in my class.

Over the past four years I have had the opportunity and priviledge of speaking with many dedicated college teachers across the country about teaching and learning, assessment/evaluation, creative grading, and

CHANGE. Most teachers teach because they have a fondness, a love, and passion for their discipline and CARE about students. Yet many of us tend to teach as we were taught; grade as we were graded. Many times, we rely on doing things in our classrooms that have "worked" for so long. Or have they? It is human nature to engage in activities that feel comfortable, enhance self-esteem, and give one a sense of competence and confidence.

Teachers are no different. In spite of what many people think -- including students and administrators -- teachers *do* have feelings!

The Changing Role of the Teacher

I hear so many of my colleagues across the country comment on how today's student is so *different* from the time we started teaching. They too are baby boomers and wonder how to cope with all the change taking place in their lives *and* their profession. We are going through a period of tremendous change in education today, from the old world to the new world. Within this major paradigm shift, in the old world, for example, things were very linear; things just came from one source. In the new world, we have random access to many resources (e.g., Internet). In the old world, lecture delivery system was basically the only delivery system available. In the new world much discussion is on cooperative learning, learning "communities," and learning colleges. In the new world, in the changing world, we are looking at inclusive education . . . including and encouraging students to become accountable for their own behavior in the learning process.

Additionally, the teacher's role is changing from the traditional information giver to evaluator, motivator, remediator, facilitator,

Spotlight

I Can Never Go Back (continued from page 3)

and coach. For some of us who find the lectern the "buoy" that keeps us "afloat" in the classroom, all these new concepts seem like nonsense, a waste of time, and just one more "fad" to contend with.

Multiple Intelligences (MI) in the College Classroom

In the pilot study and in the current MI project, students are assessed in their dominant or preferred intelligences then are provided a variety of learning options to select and succeed from. Each of the learning options (15) are academically grounded in the text and classroom material covered in the course. Having a variety of options, students select the options that will best help them grasp the material. They have access to the traditional way of tests, term papers, book reports, and article reviews, or the nontraditional method of collages, drawings, sculptures, poems, acting, dance, and musical application. Traditional tests are optional. Students are encouraged to be creative, use their imagination, and have FUN!

> I was scared and a little confused for quite a while about the options. This method required some getting used to. However, when the first option was conquered, a door opened and psychology became more meaningful. What I have learned by completing the options I chose, was that the information I gained has been imprinted into my brain.
>
> -- 18 year old female student

Why I Can Never Go Back

Having read numerous comments and evaluations of students, and experiences and seen the *creative* and *imaginative* ways they have demonstrated the learning and understanding of academic material, I will never view the teaching/learning process in the same way. Results from the MI Project at GCC indicate: (1) students want choices and options in proving "how" they are smart; (2) students will take risks in looking at different ways of learning when they are *invited*, *encouraged*, and given *direction*; and (3) students' motivation in wanting to learn academic material and time spent outside of class will increase, based on intrinsic

motivation, the opportunity to be creative, and the love of learning.

As a teacher, this is the most challenging, rewarding, creative, and satisfying experience of my entire career! Perhaps, the following comment from a 45-year-old male student sums up the experiences of many students learning the "MI Way!"

> All my life I've been taught that you open the page, you stay in the lines, and don't cross out of them . . . color within the picture that you have. When I was a kid, I drew a picture and they said it was too busy, but it had the house, the family, the dog, the airplane, the sun coming up, the clouds, but everybody said it was *too* busy. What they didn't realize was that it was actually my personality. It's easy to take risks when you are encouraged to and nobody laughs at you.

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New Alignments in Calculus Instruction

CONTRIBUTED BY CONNIE CARRUTHERS, ED CHANDLER, ALAN JACOBS, JUDY LAMBERT, JOHN LOSSE, JIM VICICH, AND KEITH WORTH ON BEHALF OF THE SCC MATHEMATICS DEPARTMENT

Ten years ago mathematics faculty across the United States were challenged to improve the three-semester calculus sequence -- challenged to make it a pump, not a filter (Steen 1988). At Scottsdale Community College we came to the slow realization that despite our earnest intentions our calculus served as a filter, not a pump. We had such a dense filter that only 38% of Calculus I students were passing with a grade of C or better. And as reported by their instructors from other disciplines even those students could not apply calculus concepts to science and engineering problems.

Though less than 5% of SCC math students take calculus, the calculus course sequence stands at the center of the department's mission. It's a capstone, the culmination of the algebra course sequence; but it's also the starting block to begin the formal study of mathematics, science and engineering. We wanted the calculus sequence to serve more students and serve them better. It needed to draw them up through algebra and on to more advanced studies. Therefore, starting in 1994, we set about to align four important factors: a change in the curriculum emphasis, different approaches to teaching, a new vision of the classroom setting, and improved access to computer technology.

We removed the existing individual desks from our newly-designated calculus classroom and redesigned it to align with our pedagogical vision which would put learning, not teaching, at the center. We oriented nine custom-designed four-person worktables so there was no "front" to the room; we positioned white boards on all four walls to facilitate group and individual presentations; we put computers and monitors under the table, so its surface was unobstructed for group work; we invested in comfortable student chairs. This environment would support our goal that students take increasing responsibility for their own learning.

We selected a textbook, *Calculus* by Hughes-Hallett, Gleason, et. al., which placed an increased emphasis on understanding calculus concepts through a variety of representations: numerical, graphical, and verbal, as well as the traditional symbolic forms. It's a readable textbook which supported our use of technology and student groups for investigations of mathematical concepts. This text, referred to as *Harvard Calculus*,

not only aligned with our instructional goals, but it was also used at the three state universities.

To make all these changes work, we developed a team-teaching rotation plan. We began with four faculty members team-teaching calculus sections during the 1994-95 school year. Eventually all members of the department would team-teach calculus with a veteran of the new environment. We wanted to develop new uses of the environment together. After all, if we expected our students to collaborate on projects, we should do it ourselves!

Each faculty member experimented with various pedagogical changes. This new setting gave us encouragement to try a number of ideas, such as collaboration and student presentations. It allowed us to find a new balance in our teaching. According to Keith Worth:

> The format and classroom have allowed daily assessments that are so effective that the old idea of unit testing is almost moot. I get a really clear idea of each student's understandings and misconceptions by observing their presentations of problems. Each student refines their understanding of the fundamental ideas involved in calculus on a daily basis. In presenting a problem, they have to extend their thinking beyond just the answer; they become more interested in the process underlying the problem solution. Over time I see them refining and improving their problem-solving strategies. Many of my former students have returned to tell me that they continue to use this process improvement model in their other classes with great success.

One of John Losse's changes was to expect students to read the textbook before class. He used class time to build upon the book rather than to explain the book. One of his students returned a year or so later, after transferring to a four-year school. She described a math professor who was difficult to follow in class. John expected this to be a prelude to her saying she was not doing well in that class but instead she said "but it's OK, because now I know I can understand math from reading the book, and I'm doing fine."

Spotlight

CHANGE : Do We Really Have A Choice?

Edgar M. Chandler
SCC

My preparation for a career teaching two-year college mathematics, like others in the 60's, was traditional: study and receive a bachelor's and master's degree in mathematics. The emphasis was on finding exact algebraic solutions along with formal and rigorous presentation. I was introduced to proofs in the calculus course and required to produce them throughout the rest of my time at college. Practical applications were an afterthought, if considered at all, and I never saw a function defined or modeled from numerical data. Graphs in textbooks were scarce, and I laboriously drew the few geometric representations that time permitted.

I was well prepared to teach traditional mathematics during my early years in the classroom. But in the 70's, I began to see the need for changes in both the content and methodology of calculus and differential equations. First, the number of topics we were required to teach increased each year, which forced instructors to cover a new topic each class period. By the mid-eighties, calculus courses harbored the totality of what all teachers of the subject and researchers in the field deemed useful and attractive. A common calculus textbook in 1985 had over 1000 pages while the calculus textbook I used as a student in the early 60's had fewer than 400 pages.

I came to realize that students must consider important ideas from various viewpoints and need time to reflect and broaden their perspective of important concepts. I was frustrated, as my students were, that we couldn't spend time considering topics in depth and exploring interesting applications. In addition, many of the students were already employed as engineers or engineering aides, and they would tell me about the many topics we studied that were never used in the real world nor ever used in the manner in which they were presented in the text.

But time and technology have given me choices. The choices, however, often spark conflict. For example, when the simple electronic calculators of the 70's eliminated the need for slide rules and numerical tables for roots and values of transcendental

functions, many predicted the change would be detrimental to student's minds. They argued that students needed the exercise of looking up these numerical values in tables and the use of which linear interpolation to glean more accuracy.

I decided I needed to pursue the choices, however, because of some distasteful answers to a simple question: "What are the alternatives to change?" If I didn't change, I would be teaching topics and techniques that technology has made obsolete. I would be asking students to spend hours deriving closed-form algebraic solutions that they could generate in seconds using readily available computer software, and they wouldn't learn about numerical and graphical representations of relations and functions that are so prevalent in practical applications. If I didn't change my curriculum and methods, my students would be using primarily algorithmic approaches to problem solving instead of developing more valuable critical thinking skills that are applicable to a wider variety of situations. If I didn't change, my students would not have the advantage of new and improved materials and methods and they would be deprived of seeing mathematics as a lean and lively subject that has real importance and interesting applications in a variety of fields.

Through a process of reading, studying, working with colleagues, interviewing perceptive professors, and creating materials for students, I have found a richer mathematical world that is full of interesting ways of thinking about mathematical ideas and their applications. Indeed, my definition of mathematics has changed and my perception of mathematical rigor has broadened.

I respect tradition, but I am willing to break with it to improve my teaching and increase student learning. Although the world of mathematics in which I was trained was restricted to algebraic methods, I have come to understand that geometric and numerical models not only have a place in mathematics, but they are the primary source of applied problems. Without denying the place and importance of training in derivations and proofs for some students, I have come to

understand that training in critical thinking skills that allows one to recognize patterns and draw conclusions from numerical data, or recognize certain geometric property such as symmetry, is valuable as well.

I believe students are better served by first being introduced to the beauty and simplicity of the fundamental concepts of calculus and differential equations from intuitive and practical points of view that involve analyzing numerical and graphical information. I believe that rigorous definition is the end, rather than the beginning of a subject. And, most importantly, I believe that mathematics and engineering students can now be challenged and empowered in ways that we could not previously imagine.

For example, the introductory course in Ordinary Differential Equations (O.D.E.), like many courses across the curriculum, is in a state of change in both content and methods. Reasons for these changes include: 1) new and powerful technologies are now available; 2) the emphasis in a traditional O.D.E. course is on finding exact closed-form solutions that often have no practical value; 3) students need to investigate differential equations that have no explicit solution; 4) the prerequisite calculus course has been changed. Leaders in the field describe the need for a "big picture course" -- a course that presents content from numerical, symbolic, and graphical points of view and requires students to interpret outcomes and predict long-term behavior through written descriptions and oral presentations. Implicit in the "big picture" recommendation are that today's new and powerful technologies will be fully utilized by students and teachers and that the teacher's role will evolve into one of a mentor and guide rather than the primary source of content.

A specific example of this type of change is in the presentation of differential equations to model the actions of a swaying building in Blanchard, Devaney, and Hall's new text *Differential Equations*. In older books, the problem could only be considered with an "idealized model" that overlooked many subtle, but important, considerations. Now, the problem comes from an actual experience

in which costly mistakes were made during the construction of the John Hancock Tower in Boston. Powerful software, that allows for a more complete model and a more realistic analysis and predictions of the physical phenomenon, accompanies it.

Options like these are based on what we now know about student learning and motivation. Although changes like these contradict a dominant belief among college teachers that knowledge is "transmitted" from knower to learner, focusing on what and how students learn provides meaningful instruction students can use because they have "helped" to construct it. Duke University professor David Smith describes these basic ideas of constructivism as "the belief that all learning is constructed by the learner in response to challenges to refine or revise what is already 'known' in order to cope with new situations." There is a simple, highly convincing proof that contructivism

better explains what's in students' heads than does "transmissionism": Ask your students to explain their thinking as they work through a problem. They will undoubtedly describe ideas and thought patterns they didn't learn from your lecture or any text. Since those ideas didn't come from the external sources, their owners must have constructed them.

The options that time and technology have presented have been full of confusion and rife with controversy. But many courageous and insightful leaders across the nation have provided direction for changing curriculum and pedagogy, and the rewards are enormous. The rewards for me are in observing students actively learning -- engaging in projects, interacting with each other, using the computer to analyze and explore. By empowering students with new tools and methods, they can experiment and investigate in ways that were previously unimaginable.

This period of rapid change that we are experiencing in higher education means, as Uri Treisman stated, "We are expected to teach things we have never learned in ways that we have never experienced." To overcome the tumultuous effects of such fundamental changes, we must all approach change with collegiality and openness to new ideas and innovative methods. We need to help each other. This happens occasionally with criticism and suggestions but always with the intent of encouraging each other through these sometimes difficult, but mostly exhilarating times.

And, when we have doubts about the need to change and move ahead in content, methods and the use of technology, we just need to ask ourselves, "Would I go to a doctor today who insisted on treating her or his patients the same way they were treated twenty years ago?"

Change, Learning, and the Future
JON ROBINSON, STUDENT, PVCC

I am from Canada and the biggest change I experienced in learning was when I moved to Arizona. I was only in high school here for one year, so I do not have that much experience to draw on. Perhaps the biggest difference was how teachers treated their students. It seems obvious that teachers would love it if all their students got A's. However, most, if not all, would agree that the individual students need to *earn* their grade. In Canada, high school students were treated more like college students; the teachers wanted the best for their students, but the responsibility was left to the students (i.e., attendance). In Arizona, the high school students have their hands held, even in their senior year. "Extra credit" was a completely foreign concept to me. At first I thought that it was a worthwhile concept -- and it is if properly applied. Unfortunately, it is misused. Extra credit should be awarded based on 'extra' scholastic effort; going the extra mile so to speak. Awarding extra credit because a student dressed up for 'Mardi Gras Day,' or brought in a can of food for the food drive makes a mockery of the educational system. When extra credit is misused, a student's grade does not necessarily reflect their scholastic achievement.

This kind of misuse of an inherently good idea is likely to aggravate students lackadaisical attitude towards school -- otherwise known as 'faking it.' Faking it is usually the attempt to receive the desired grade while doing the least amount of real work. Misapplied extra credit makes it easier to achieve that B+, for example, because instead of taking the mythology quiz, you can wear a silly-looking costume one day, bring in three cans of red beets, or a can of Spam the next day. In the future, it would be a good idea to restrict the allocation of extra credit for solely academic work. Students will either get lower grades (maybe more realistic grades) for the same amount of work -- "Tough lucky, Danny," or will do more work to get their desired grade, which is a positive trend.

Luckily, this giving away of grades seems to stop at institutions of higher learning.

To the credit of PVCC, I have not seen this kind of abuse of extra credit. As might be expected of college, as compared to high school, there is a stronger emphasis placed on 'scholastic' achievement. In fact during my time at PVCC, only a couple of classes even offered a chance to earn extra credit. This is not very surprising, I would expect colleges to

treat academic studies more seriously. Of course, colleges are not perfect, and they have their own problems. As the future looms just beyond the present, people start looking for some new, innovative changes.

An interdisciplinary approach to learning should be a key change in the future of education. In school, students are taught different 'subjects' which are isolated areas of learning. In real life, however, these different disciplines are all related. Thus, the life of a student is far removed from that of the working world. An interdisciplinary style of education would help students see how everything is connected, from business to science to philosophy -- and how you need all kinds of different skills for all careers.

Another benefit of an interdisciplinary education manifests itself as environmental concern grows. Integrated learning shows the connection between disciplines and their impact on other disciplines. This makes a student, one who has benefited from this new approach, understand how selling cars may encourage economic growth and yet still encourage environmental destruction.

It seems that an interdisciplinary education offers all that the traditional education offers, and some new benefits that have not been considered before.

Spotlight

Kaleidoscope Education

JENNIFER PAIGE BOONLORN, STUDENT, PVCC

Home schooling is like a kaleidoscope, each time you look through it you see a new color, shape, and design. It's metallic, it's iridescent, it is always different. I have been home schooled for almost all of my school years. Now, as a college freshman, I believe that this particular style of education has had a vital impact on my life and academic career. Home schooling has definitely *changed my education* and helped to *shape my future.* It has allowed *me* to develop in *my* own unique way and be an individual. I have been able to pursue the things that mattered most to me. But, above all else, home schooling has taught me that God's world is very diverse and that I must deal with each person on his or her level. At the same time home schooling has put me in contact with all sorts of people and events -- just like an ever-changing kaleidoscope.

Home schooling is just like anything else in life; you get out of it what you are willing to put into it. For me home schooling was one positive experience after another. My sister and I believe we did not miss out on anything vital to our education as a result of being home schooled. We participated in organized sports, and were a part of a "cultural literacy" group and a history group; art and music came through private lessons, some even taught by other very qualified home schoolers. We also worked our way through two years of Latin as part of a small group of homeschoolers who were taught this subject by a public high school teacher. We even planned and attended our junior and senior statewide home school proms. This is not nearly a complete list of all the activities and events we participated in, but it does outline some of the opportunities that home schooling has provided. To answer the question most often posed to home schoolers, socializing was never a problem. We had many friends, and most of us joined in many of the same activities.

Having been home schooled most of my life, community college was the perfect route to go for my college education. With community college, I could spend two years at a small school getting used to college life, without being thrown into a class of 500. Community college would become the stepping stone between what I am doing now and all that academically lies ahead. Paradise Valley Community College has been very accepting of me as a home schooler, and the faculty and staff have made the transition between high school and college a very smooth process. I was impressed with how accommodating PVCC was to me; through the help of several faculty members I was able to receive the President's Scholarship, which is usually given only to students who graduate from public high schools. I also was quite honored by the fact that two of the faculty members at PVCC nominated me for the All-USA Community and Junior College Academic Team. Last semester I was able to climb to the top of Mr. John Nelson's Honors English class. As a result of this class I have seen a great deal of improvement in my writing and thinking skills. My American Government class (Political Science 110) taught by Dr. Abigail Hemingway, sparked a real interest in government and the legal system. I am indebted to Dr. Hemingway for the fact that my future plans now include the possibility of attending law school. PVCC has had a profound impact on my education thus far, and I can wholeheartedly recommend it to home schoolers who plan to attend in the future.

Home schooling has prepared me for the road that lies ahead (at this point I hope the College of Business at ASU, and then law school) by encouraging me to be a self-starter and self-learner. PVCC has helped to develop and expand what I had already learned during my homeschooling days. I know that if I truly want something, I must be motivated enough to work both academically and physically very hard to achieve it. Each day Paradise Valley Community College, coupled with home schooling as my foundation, furthers yet another aspect of my education. Each experience is different and new, colorful and bright, and it all comes together in the kaleidoscope of life.

learning@maricopa.edu . . . The Learning Continues!

BY JACKIE MORAN AND NAOMI STORY, MCLI

More information is available at: `http://www.mcli.dist.maricopa.edu/learning/`

The learning initiative taking place at Maricopa continues to make headway. Last fall, the initiative was bolstered by the publication of the paper, *learning@maricopa.edu.* Authored by two faculty members, Bob Bendotti (PVCC) and Donna Tannehill (RSC), the paper serves to stimulate the dialogue on learning and to encourage actions that would solidify learning as a core value throughout the Maricopa Community College system.

learning@maricopa.edu is one of the results of our ACE (American Council on Education) Project Team on Leadership and Institutional Transformation. This faculty-based team inherited the challenge of implementing learning as the core value of our system. An earlier document, "Maricopa Roundtable Policy Draft," provided the initial catalyst for strategic conversations in our institutional transformation. However, the project team realized quickly that few among our faculty had a chance to review and discuss its merits.

Between October 1996 and early spring of 1997, faculty throughout Maricopa were engaged in discourse on the initial roundtable document. Responses were collected and, in the summer of 1996, Bendotti and Tannehill reviewed thirty-six responses from across the district. Those responses became the starting point of a discussion on what learning means at Maricopa and the basis for *learning@maricopa.edu*. Everyone at Maricopa appeared to be interested in the dialogue on learning and incorporating learning in a more holistic way. But the MCCD as a whole seemed to lack a coherent and sustainable system that could foster such a dialogue and allow for action toward a learning-centered organization.

learning@maricopa.edu offers three primary areas of consideration that could assist in creating such a coherent and sustainable system. The first embraces a systems perspective, which asks every individual to consider how his/her own work affects and is affected by the larger systems that surround it.

The second area recognizes that developing shared meanings is essential. With that in mind, the authors offer several characteristics of learning for readers to consider. The characteristics include stating that learning is complex, transformational, natural and life-long, multi-level, fundamentally personal yet also social, active and interactive, measurable, and that learning is greatly influenced by organizational factors, including leadership, culture, and structures. Each of these areas are discussed briefly in the paper.

The third area *learning@maricopa.edu* considers is action. The action that the paper suggests encourages us to go beyond the rhetoric or definition of learning. For example, we should question and assess our current systems, processes or structures. We should, then, reform those that are barriers to learning.

The paper concludes by encouraging readers to continue the dialogue throughout their colleges and the MCCD. The ACE Project Team has set in motion a plan to do just that. Last November, shortly after the paper began to be distributed among the colleges, South Mountain became the first MCCD college to host an Open Space Forum on learning. This forum incorporated the Open Space Technology method, which allowed participants to identify and discuss their issues and notions about learning as well as their inspired directions and commitment to action.

Some of the issues that participants raised included integrated learning communities, academic class structure (scheduling, credits, load hours), convenience at the risk of learning, how FTSE drives structure, and the faculty as learner. Participants also suggested individual and organizational actions such as questioning new delivery methods and contributing to their soundness, convening a district-wide forum to assess what has and hasn't worked in learning communities, exploring different loading for the multi-level developmental educational community, working in concert with others on FTSE reform, and being a model of lifelong professional learning.

Overall, participants enjoyed the Open Space method and encouraged its use at other Forums. The success of the South Mountain meeting has led to additional forums which will be scheduled. On February 20, Mesa Community College held its own Open Space Forum, and a GateWay Forum is scheduled for April 7.

The ultimate goal of the ACE Project Team is to transform the institution, the Maricopa system, and to make learning a true and authentic core value for everyone. *learning@maricopa.edu* is one of the catalysts. The other is the Open Space Forum. Clearly, the ultimate outcome will be evidenced by each of us making decisions and choices based on learning.

We encourage everyone -- students, faculty, Governing Board members, staff, administrators, and our extended constituents and partners -- to read the paper and to join the discourse, so that we can together recast our system to be a truly authentic learning-centered system. As one participant at SMCC said, "We just need to do it."

Spotlight

Using a Student's Fund of Knowledge to Guide Discovery

Maria Romo Chavira, MCC

In addition to receiving a college education, today's student is looking for a smoother transition from college to work. In order to fulfill this need, teachers are seeking new teaching methods that will enable students to make a cohesive transition from high school to college and from college to work. All too often, the traditional didactic teaching approach makes students passive learners and does not take into account a student's interests and experience. Students need to learn how to transfer their knowledge to other settings and develop the ability to think critically and learn independently. The classroom provides the perfect opportunity for the instructor to guide the student to new discoveries.

Research conducted by the U.S. Department of Education's *National Assessment of Educational Progress* "indicate[s] that current curricula and teaching methods successfully impart facts and rote skills to most students but fail to impart high-order reasoning and learning skills" (Bruer, 1993). Each teacher has the opportunity to design a unique learning community through the decisions they make about curriculum design/presentation and assessment of learning. In my opinion, traditional educational approaches are not meeting the needs of a large majority of students because the student population is more diverse compared to the student population 20 years ago. For example, the *Digest of Education Statistics* (1996) illustrates an increase in the number of students who work in order to finance their education. The number of older students has been growing more rapidly than the number of younger students. Between 1980 and 1990 the enrollment of students under age 25 increased by 3 percent (*Digest of Education Statistics*, 1996). Between 1993 and 1995, enrollment rates in 2-year institutions for Hispanics increased (*Digest of Education Statistics*, 1996).

To account for the changing demographics of today's typical college population, I have adopted a teaching framework which I believe will help to prepare students for the many challenges they will face in the work force and in their academic careers. My philosophy has been influenced by Vygotsky's (1978, 1988) assertion that acquisition of psychological tools, language, concepts, (et cetera) is influenced by social variables. According to Wertsch (1985) "One of the most fundamental assumptions that guided Vygotsky's attempt to reformulate psychology ... [was] to understand the individual, one must first understand the social relations in which the individual exists." Under this assumption, it is important to understand the knowledge that students bring to the classroom. This awareness can then be used as a teaching tool to help students understand concepts which are unfamiliar by bridging the concepts with the student's unique knowledge and experiences.

My teaching methodology emphasizes that students learn to answer "why" questions and are encouraged to explain and defend their positions. My assessments do not typically include the standardized tests which require rote memorization, but rather require that students demonstrate their understanding of basic principles. Some of my teaching strategies include:

1. critical thinking and conceptual understanding
2. problem solving based on real-life problems
3. meaning-centered rather than memorization-oriented learning opportunities
4. active learning and activity-based instruction
5. contextualized learning which makes connections to students' experiences
6. collaborative learning in groups
7. interdisciplinary learning

For example, in my research methods course, students develop a research project based on their own interests and then work together with other students as a research team. One of the goals of the team is to allow students to critically analyze the research methodologies of the other students in their group. This method allows students to use their knowledge and understanding of research and apply it to a real problem. For instance, in the beginning of the course, the students are to develop a research hypothesis. Team members will present their research hypothesis and explain their interest in the topic. The other team members must use their understanding of the alternative hypothesis and the null hypothesis to determine if the presented hypothesis meets the requirements of a "good research hypothesis." Students share their ideas in small groups and use their

Collabra listserv accounts to communicate their discussions with the whole class and instructor. The students then present their findings to the instructor who further questions their conclusions to determine the students' understanding and application.

This framework is a marked shift from the traditional prescriptive approach (old paradigm) that identifies the general subject matter objectives that students are expected to learn. Using this approach, students are able to master nine essential skills:

1. use of technology
2. problem solving
3. reading
4. integrative thinking
5. writing
6. teamwork
7. communication competence
8. quality work
9. critical/analytical thinking

The following comments were made by students enrolled in my research methods course fall 1997:

I liked the project because it helped me learn what to do with my future research papers. It gave me a good outline on how to go about doing a research paper.

It was good that you did not have tests. To me, that's all short term memory stuff. But with the project, you actually do something and learn about what the paper should consist of.

I feel as though I learned a lot about research and it gave me a good idea of what it might be like.

This class has really opened my eyes to the research world and what it portrays to the public.

I think that the project idea is a lot better than tests. In every other class there are tests and many people cram for them and forget.

As part of their research teams, students use Collabra, a product of Netscape, to communicate with their research teams, the instructor, and the class. Students use technology to assist them with their problem-solving skills. For example, if a student is having difficulty understanding why their proposal does not meet the criteria for good research, other students will use their critical thinking skills by applying their knowledge to the problem which is communicated to the student via Collabra. Collabra also allows students to communicate with their instructors more frequently. If a student is having trouble with a project, for example, they are able to contact me directly, and I am able to respond promptly. Students are also required to join a discussion group pertaining to their research topic which allows them to keep abreast of the national debate. I have found that joining a national listserv increases a student's motivation because they realize their topic is of national concern and not merely a project for their class.

For more information about this teaching methodology, please contact:

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You Say You Want an Evolution?

C HRISTINA E MMONS, MCLI

It is easy, and somewhat simplistic, to say that "life" is one continuous learning experience after the next and how wise you become depends upon your ability to learn from each experience and then apply that knowledge to the next challenge. Most of us incorporate this little bit of philosophy into our lives in principle, but things get muddy when it becomes personal. This is especially true when it becomes apparent that wisdom doesn't come without some pain. For most learning is easy, it's a simple matter of gathering information and storing it. The complicated part is using what has been learned.

Maricopa's grand initiative to become "learning-centered" strikes me as both incredibly wondrous and incredulously ponderous. (Consider the Learner-Centered System (LCS) project currently being developed.) To me, the idea of focusing on something as abstract as "learning" is confusing. In theory it makes sense: we are all learners, and every day brings new knowledge and experiences we must adapt to in order to survive. Practically, however, the idea of focusing on "learning" becomes a secondary consideration -- who has time to ponder the intricacies of the universe while continuously being bombarded with the infinite trials and tribulations of life?

As someone who doesn't particularly care for the idea of change (yet can, ironically, adapt instantly to it) it is difficult to decide if the benefits of changing the Maricopa system outweigh the costs. Paradoxically, I know that without change nothing grows to its full potential. Each of us have to decide if such benefits do exist. Personally, as long as the benefits do outweigh the costs, I'll be riding high on the waves of change, smiling serenely.

Calculus Instruction (continued from page 5)

The experience of team teaching has been a career highlight for several of us. Connie Carruthers especially enjoyed the interaction with two different faculty members, and two different teaching styles. Students observed how the faculty talked to each other and seemed to appreciate the teamwork involved. Exposure to that kind of faculty discourse in every class meeting was a tremendous addition to their learning.

Judy Lambert values learning and modeled Ed Chandler's style of thoroughly investigating a topic using numerical, analytical and graphical methods. She characterizes this style as the best way to gently lead without rushing to answers.

This experience has affected the way we teach the rest of our classes. John Losse speaks for all of us when he states that "most of my classes are recognizably different than they were five years ago, and not just because of changes in technology." This experience has served to improve our classroom teaching, because, as Jim Vicich says, "we are developing the ability to provide a variety of learning experiences for our students. We don't all teach the same; far from it, we are developing an even greater diversity of styles."

The positive benefits of this innovation have been two-fold: for students and for faculty. Not only have students improved their oral presentation skills, their collaborative skills, and their confidence in their own abilities, but more students have achieved greater learning in calculus than before. The student success rate (grade of "C" or better) improved dramatically. In the ten semesters prior to Fall 1994, Calculus I students had an average success rate of 38%. Since Fall 1994, the success rate improved to an average of 53%. Likewise, Calculus II students had an average success rate of 46% in the 10 semesters prior to Spring 1995. After our changes, their success rate improved to an average of 64%. Of course, grades are somewhat subjective, so we invoked another quality measure. We continued to give Calculus I students the same common final exam that we had given in the years before. We found that the achievement of post-innovation calculus students was consistently slightly higher on this common final exam than students from previous years.

We faculty have developed a greater array of instructional techniques. More than that, we have increased our sensitivity to the issues of *learning* mathematics, not just the problems of teaching mathematics. We have increased our respect for each other's teaching; we have learned from each other; we have achieved 100% participation. And, as Judy Lambert relates, "we all had a spirit of learning, even the instructors!"

Reference

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