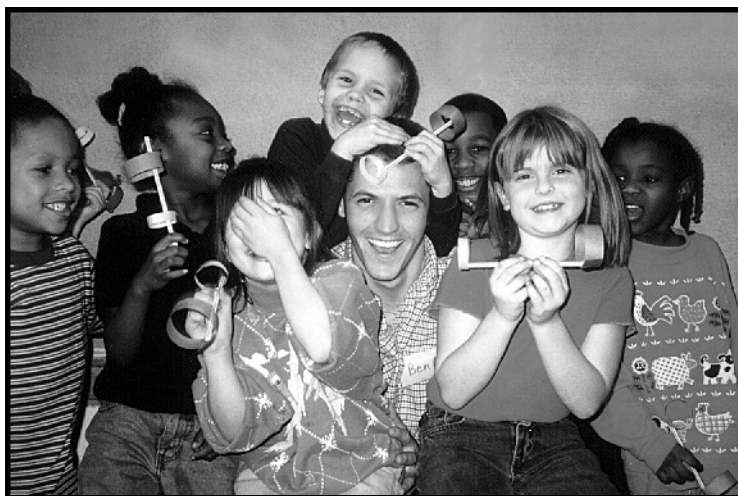


# Final Evaluation

21 March 2002



**K–12 Education Outreach Program,  
Center for Ultrafast Optical Science;**

***Reach Out!* student organization;**

**and**

**Southeastern Michigan Math-Science Learning Coalition**

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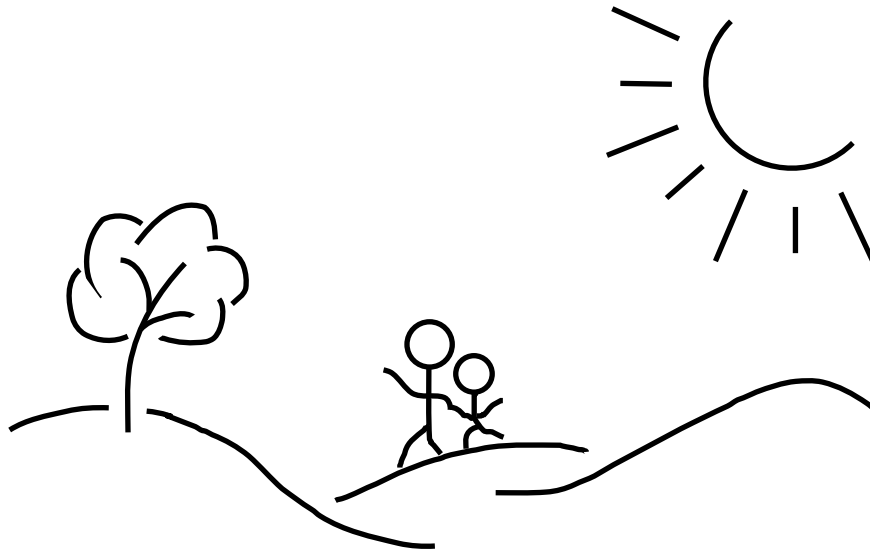
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After March 2002, if connections fail, try  
[www.reachoutmichigan.org/](http://www.reachoutmichigan.org/) and [reachout@comcast.net](mailto:reachout@comcast.net)

*The rewarding thing about an adult becoming involved in the life of a young person is that it changes both lives for the better.*

- Nelba Chavez



### **A Small Disclaimer: Why our numbers seem to change in every chart**

Our databases track academic mentors, career mentors, science club mentors, academic mentees, career mentees, and science club participants by semester—our programming unit. New clubs start with each new semester, even if many of the same volunteers and children stay over from one to the next. Mentoring pairs are matched every semester, even though many continue together for one semester after another. So, the same individuals are counted anew for each new program.

Sometimes we group categories such as academic and career mentoring (which are often offered simultaneously to the same teens), but other times they are broken out to make a particular point. Sometimes we talk about science activities, including *one-time* activities, and other times confine ourselves to science *mentoring* (ongoing, weekly meetings of the same people).

Some programs cross boundaries in a way that makes them hard to classify. Camp Discovery contains elements of science and career mentoring, and a lot more. Youth Task Forces tend to involve science, career, and academic elements. Summer algebra specifically combines academic and career guidance. These programs may be listed in one category or another, depending upon what the chart is illustrating.

Our Web-based list of volunteers is by name, so each individual is listed only once, even if he or she participated in several capacities over many years. Also, this listing includes volunteers who provide sporadic support services: chauffeuring volunteers or children, hosting tours, donating meals, etc. They are certainly not mentors, but their service is also vital to what we do.

**In other words, when the numbers are not the same,  
it is because they are referring to (sometimes only slightly) different things.**

# Table of Contents

<b>I. Introduction</b>		
A. Preamble .....	1	
<b>Chart:</b> Individual Volunteers 1995–2002 .....	1	
B. Mission .....	2	
C. Who We Are and What We Do: A Summary .....	2	
<b>Chart:</b> Partners Who Have Funded Our Work, 1997–2002 .....	3	
D. Values and Principles .....	6	
<b>II. What We Do and Have Learned</b>		
A. Themes .....	7	B. Voices
1. <i>We are about community-building</i> .....	7	<i>personal testimony in a parallel track</i>
2. <i>We are about empowerment</i> .....	8	
<b>Chart:</b> Individual Children Served, 1995-2002 .....	9	
3. <i>We see outreach work as a developmental process</i> .....	11	
4. <i>Outreach is positively transformative for the mentors</i> .....	13	
<b>Chart:</b> Individual Mentors, 1995-2002 .....	14	
5. <i>Math and science aren't everything</i> .....	15	
6. <i>Why we fail to attract and keep women and minorities</i> .....	17	
<b>Chart:</b> UM Student Volunteer Affiliations, 1995–2002 .....	17	
7. <i>Science and math outreach cannot be more of the same</i> .....	19	
8. <i>We take accountability seriously but define it differently</i> .....	20	
<b>Chart:</b> Science Activities by Community .....	20	
<b>III. Nuts &amp; Bolts: Replicating Our Organization</b> .....	25	
A. <b>Chart:</b> Building a Math-Science Learning Community .....	26	
B. Strategies .....	27	C. Voices
1. <i>Train the trainers</i> .....	27	<i>personal testimony in a parallel track</i>
2. <i>Mentor the mentors</i> .....	31	
3. <i>Build in time for reflection</i> .....	35	
4. <i>Take advantage of the availability of young adult volunteers</i> .....	37	
5. <i>Pay your coordinators</i> .....	38	
6. <i>Avoid dollars with strings attached</i> .....	39	
7. <i>Give youth opportunities to <u>do</u> science and math</i> .....	40	
8. <i>Provide for personal and career exploration</i> .....	45	
9. <i>Use technology to widen your reach and to report on your efforts</i> .....	48	
10. <i>Expect bumps in the road</i> .....	50	

## **IV. Final-Year Programming**

A. Coalition Meeting .....	52
B. Pontiac Youth Task Force .....	52
C. Science Clubs .....	53
D. Computer Challenge Clubs .....	53
E. Teen Academic Mentoring .....	54
F. Slauson Middle School Builders Club .....	54
G. Detroit World Outreach Career Exploration Center .....	54
H. Wayne State University's HealthFOCUS Conference .....	54

## **V. References..... 55**

## **VI. Appendices**

A. Peer Review of Our Programming .....	56
1. <i>Summary of Findings and Recommendations</i> .....	57
2. <i>Addendum: Sites and Collaborations</i> .....	60
B. Congruence of <i>Reach Out!</i> and UM Goals and Values .....	62
1. <i>North Central Accreditation Process</i> .....	57
2. <i>President's Commission on the Undergraduate Experience</i> .....	58
C. Goals & Methods for <i>Reach Out!</i> Volunteers .....	66
1. <i>Goals</i> .....	66
2. <i>Methods</i> .....	66
D. Program Summaries 1995–2001 .....	68
1. <i>Science Clubs</i> .....	68
2. <i>Career Exploration Programs</i> .....	69
3. <i>Academic and Personal Mentoring</i> .....	70
4. <i>Services to Teachers and Other Community Members</i> .....	70
5. <i>Learning Community Development</i> .....	70
E. Photo Gallery: A Sample of Who We Are .....	75
F. Organizational Chart .....	78
G. Coalition Partners List .....	79
H. Volunteers List .....	79

# I. Introduction

## A. Preamble

If you are reading this, we assume, you already grasp the problems of our children and teens today, so we won't waste your time laying them out. We assert that young people cannot wait for studies, task forces, or pilot programs. *They need action, and they need it today.* Kids can't wait, so we're not waiting—we are mobilizing young adults and community folks and organizations to give them the guidance and care they need to develop into whole, competent adults who can work constructively and collaboratively to improve their society. In President Bush's phrase, we are "rallying the armies of compassion."

Our programs evolve constantly because we don't wait to develop the perfect model before acting. In fact, we don't believe there *is* any perfect model for rebuilding community around our children and nurturing their development; a community follows the values and passions of its members, so each community's approach and methods will be different. Form doesn't matter. *What does matter is that we all hold ourselves accountable* for the accomplishment of any society's and any family's primary task: perpetuating itself through the successful raising of its young. This is not a spectator sport—we are all players, whether we acknowledge that or not. We all have a vital stake in the outcome.

These annual progress reports are written not because anyone requires them, but because we hold ourselves accountable to our **stakeholders**, including the National Science Foundation (and the taxpayers whose funds support their programs); the University of Michigan (which has provided us with critical infrastructure and other enabling support); the university folks—especially undergraduate students—who have formed our volunteer backbone through the years; the local community partners who have contributed funding, sites in which to work, and vital humanpower; and the children and teens who have allowed us into their lives and allowed themselves to depend upon us. Their families and teachers also deserve an accounting of what we have learned while sometimes encroaching upon their provinces.

We are writing this year's report and evaluation from the perspective that we do not know whether we—the K-12 outreach folks now sponsored by CUOS, the Center for Ultrafast Optical Science ([www.eecs.umich.edu/USL/](http://www.eecs.umich.edu/USL/)) at the University of Michigan, the *Reach Out!* ([www.umich.edu/~reachout/](http://www.umich.edu/~reachout/)) student organization sponsored by them, and the Southeastern Michigan Math-Science Learning Coalition ([www.eecs.umich.edu/mathscience/](http://www.eecs.umich.edu/mathscience/)) facilitated by them—will still exist in April 2002. This uncertainty leads us to a summative report that will communicate the most important things we have done and learned over the past several years. We intend to demonstrate progress and effectiveness, to show that money and other resources invested in us have been successfully deployed. We are less improvement-oriented and more knowledge-oriented this time, since, not knowing whether we will be here to improve things next year, we are more anxious than ever to disseminate what we have learned for others to replicate. In jargon, we have some "best practices" to share that we don't want lost with our possible demise.

While we will provide overall numbers and summarize programs for the past six years, we believe that the more valuable part of our analysis will be to extract **themes**,

### ***Individual Volunteers 1995–2002***

<i>Academic Support</i>	779
<i>Career Exploration</i>	47
<i>Science Activities</i>	553
<i>Summer Camp Counseling</i>	23
<i>Support Service Providers</i>	108

**Total: 1,510**

*Note: counts each person again for each new program; also, see note on inside front cover.*

which can be generalized to other situations and can serve as a model for replication. There is no “cookbook” for what we do: it requires endless adaptability and tweaking. Yet a focus on processes—both in the development of programs and partnerships and in that of individual participants—can, we believe, communicate **what works and why**.

Another purpose behind this report, of course, is to garner support for the continuation of our programs, after the predesignated “sunset” of our sponsoring center, CUOS. Any reader with advice or resources to offer is encouraged to contact Program Director Jeannine LaSovage, (lasovage@umich.edu).

## **B. Mission**

As the U.S. Congress found in the proposed National Science Education Act, H.R.100, 2001 ([http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=107\\_cong\\_bills&docid=f:h100rh.txt.pdf](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=107_cong_bills&docid=f:h100rh.txt.pdf)), the United States needs scientists, mathematicians, and engineers to continue the research and development that are central to our economic growth. We need technologically proficient workers who are comfortable and capable dealing with the demands of a science-based, high-technology workplace. And we need scientifically literate voters and consumers to make intelligent decisions about American and even global public policy.

The mission of CUOS K-12 Outreach, *Reach Out!*, and the Coalition is to help fill all three of these needs, with a particular focus on the women and minorities who are typically underrepresented in science, math, engineering, and technology (SMET) careers and on the disadvantaged who are commonly left behind as the technology train leaves the station. We aim to increase the scientific literacy of all groups and to support the technical learning and career aspirations of any interested young people we can reach. Moreover, our undergraduate student volunteers from the University of Michigan experience personal growth through outreach, which contributes to their retention by the university and to their effective functioning as students and as citizens.

## **C. Who We Are and What We Do: A Summary**

*We have realized our mission.* We have successfully developed a movement across campus and with partners in business, K-12 schools, churches, and other community organizations to leverage and link mentors with children for science clubs and with teens for academic support and career exploration. We have mobilized hundreds of college-age adults to form ongoing relationships with children and teens, meeting the needs of both sides for human connection and a sense of purpose. We have successfully integrated community adults, especially retirees, into programs, where they enjoy learning from and guiding the young adults they work alongside and the children and teens they serve. Our system and programming are a model for the state and, we believe, the nation. Here is the abbreviated version of who we are, what we do, and how. Our specific strategies, all aimed at drawing more stakeholders into our common enterprise, include

1. Fostering learning communities that engage all ages and sectors of society in common work;
2. Establishing science and career clubs in schools, churches, and community centers;
3. Linking academic and career mentors with youth;
4. Helping children to teach science and to engage in their own research; and
5. Maintaining a Web site to collect resources, recruit volunteers, and report on programs.

As noted above, “we” encompasses the CUOS K-12 Education Outreach Program, the *Reach Out!* UM

student organization, and a southeastern Michigan community coalition—all focused on math and science learning and literacy. All three are rooted in the mandate by the National Science Foundation that Science and Technology Centers, including CUOS, do K–12 outreach for the purposes noted under “Mission.”

CUOS outreach started small after the center was established in 1991, handled “on the side” by center administrator Autumn Craft, who hooked up with existing UM outreach programs: the Minority Engineering Program Office’s Detroit Area Pre-College Engineering Program ([www.state.outreach.umich.edu/aop-bin/urel/viewitem?303+](http://www.state.outreach.umich.edu/aop-bin/urel/viewitem?303+)), DAPCEP, and the Center for the Education of Women’s SummerScience for Girls, later Future Science: Future Engineering ([www.state.outreach.umich.edu/aop-bin/urel/viewitem?93+](http://www.state.outreach.umich.edu/aop-bin/urel/viewitem?93+)).

CUOS graduate students were hired to coordinate portions of each summer program, for which other graduate students volunteered to develop and run specific learning activities. Later, as it became more difficult to recruit enough CUOS graduate students, we turned to School of Education student coordinators and to undergraduate volunteers. The first CUOS K–12 Outreach Director, Debbie Clark-McCormick, began partnerships with Owen Elementary School in Pontiac and with Lessenger Middle School in Detroit, which brought UM scientists and students of all kinds to the schools for one-time activities with both children and teachers.

When Jeannine LaSovage replaced Ms. McCormick as Director, she brought with her the partners and the format of a learning community coalition based in Ypsilanti. Over the course of summer 1995, past and potential coalition partners met several times to form the Southeastern Michigan Math-Science Learning Coalition. This new coalition was both broader and narrower than its predecessor: the geographic area expanded to include Wayne, Oakland, and Washtenaw Counties (but specifically not limited to them), while participants agreed to focus on math and science. All participants appreciated the value of reading- and recreation-centered programs, but they further recognized that hardly anyone was doing outreach with a technical flavor. Later, we discovered the same was true for career exploration programs; in both cases, we fill a need that was largely ignored.

The Coalition is a loose organizational framework surrounding a shifting cast of partners whose collaborations also evolve constantly. We help each other when and where we can and share collective wisdom and experience. The CUOS K-12 staff provides support services for new initiatives and ongoing programs, which is what permits constant evolution without loss of effectiveness. We do have some expertise to offer and consider it part of our jobs to mentor others who are just beginning to do the same kind of work. Usually these intense coaching periods only last six months or so, and we think they

<b>Partners Who Have Funded Our Work, 1997–2002</b>		
<b>Government</b>		<b>\$1,154,220</b>
National Science Foundation	1,139,220	
City of Pontiac	15,000	
<b>Community Groups</b>		<b>14,729</b>
Downtown Ann Arbor Kiwanis	6,750	
Ann Arbor Neutral Zone	3,000	
Ann Arbor Bethel AME Church	2,600	
Ypsilanti Community Church of God	2,379	
<b>K–12 Schools</b>		<b>54,000</b>
Ann Arbor Pioneer High School	9,000	
Ypsilanti George Elementary School	5,000	
Pontiac Owen Elementary School	40,000	
<b>University of Michigan</b>		<b>75,586</b>
President’s Office	40,000	
College of Engineering	17,500	
Dept. of Elec. Engin. & Computer Science	200	
Center for the Education of Women	756	
Office of Academic Multicultural Initiatives	6,480	
Community Service Commission	650	
Road Scholars	10,000	
<b>Individual Donors</b>		<b>2,765</b>
<b>Total:</b>		<b>\$1,301,300</b>

contribute something of real value not readily obtainable elsewhere. It's all part of the learning community philosophy.

As we recognized how much children and teens needed in services, and tried to expand programs accordingly, we suffered a severe volunteer shortage. To deal with it, we went first to the College of Engineering (CoE) and then to the university community as a whole. Large numbers of volunteers, almost all undergraduate students recruited by *Reach Out!*, allowed us to do more. In December 1996, four part-time, work-study student members of CUOS outreach conceived of a campus-wide student organization with the goal of enlisting volunteers to promote math and science literacy and to facilitate career exploration for children and teens in the community. In January 1997, with the leadership of these students and the sponsorship of CUOS Outreach Director LaSovage, the group was officially named and registered with the Michigan Student Assembly. The (UM) President's New Century Fund for Diversity provided the seed capital to create *Reach Out!*, funding work-study or stipend pay for UM student coordinators, consumable and nonconsumable science materials, family outings, and t-shirts and refreshments for recognition and celebration parties at sites. Since that time, our joint work has been financially supported by small grants from many community partners, in addition to several arms of the university. They include the UM College of Engineering, the Electrical Engineering and Computer Science Department, the Office of Academic Multicultural Initiatives, the Ginsberg Center for Community Service and Learning, the Community Service Commission, and the Road Scholars program at the University of Michigan; the Downtown Kiwanis, the Neutral Zone, Bethel AME Church, and Pioneer High School in Ann Arbor; Community Church of God and George Elementary School in Ypsilanti; the City of Pontiac and Pontiac Owen Elementary School; plus a dozen or so individuals.

**In the course of the past seven years, 1995–2002, *Reach Out!* and CUOS K–12 Outreach have achieved the following:**

- Some 779 mentors helped 804 individual teens and children with ongoing academic tutoring and personal support. [[www.eecs.umich.edu/mathscience/reachout/intro.html](http://www.eecs.umich.edu/mathscience/reachout/intro.html)]
- Five mentors shepherded 14 teens through summer-long algebra and chemistry study, some for Community Resource credit with Ann Arbor Public Schools.
- Eleven mentors worked with groups or clubs to help dozens of young people (not including the Career Fair [[www.eecs.umich.edu/mathscience/exploringsci/careercon/scrapbook.html](http://www.eecs.umich.edu/mathscience/exploringsci/careercon/scrapbook.html)] we cosponsored at the Neutral Zone this year) to explore their personal strengths and career options. Nineteen volunteer Kiwanians took 28 teens through a multi-week personal discovery and career exploration process [[www.eecs.umich.edu/mathscience/reachout/CarMen.html](http://www.eecs.umich.edu/mathscience/reachout/CarMen.html)] culminated by targeted job shadowing.
- Twenty-three counselors mentored 37 children through the Camp Discovery summer day camp; 12 of these children and their mentors returned after the summer 2000 camp [[www.eecs.umich.edu/mathscience/discovery/camp2000/2000camp1.html](http://www.eecs.umich.edu/mathscience/discovery/camp2000/2000camp1.html)] for a one-day reunion in spring 2001. Many of these children also see us regularly at our community science clubs during the school year.
- Our part-time Learning Community Coordinator in Pontiac formed a Youth Task Force on the Environment (jointly supported by the city), which investigated leaking underground tanks on city property and reported their findings to the City Council in spring 2001. [[www.eecs.umich.edu/mathscience/YTF/ytf.html](http://www.eecs.umich.edu/mathscience/YTF/ytf.html)] The second YTF in fall 2001 was jointly sponsored by the City of Pontiac, the General Motors Truck & Bus Group, and the UM Roads Scholars program. Ten teen boys investigated recycling issues related to the auto industry and reported on them to the City Council.
- Not including one-time events, 503 volunteers had science fun with 1174 children in 87 separate science clubs that met more than 8 times each. [[www.eecs.umich.edu/mathscience/scienceclubs/clubs.html](http://www.eecs.umich.edu/mathscience/scienceclubs/clubs.html)]

- More than 30 upper elementary students were trained as Science or Technology Wizards [[www.eecs.umich.edu/mathscience/wizard.html](http://www.eecs.umich.edu/mathscience/wizard.html)], who share their expertise with other children in school and community groups. Wizards came to UM from Pontiac Owen Elementary School for a series of visits with university scientists and engineering faculty. [[www.eecs.umich.edu/mathscience/PPS/wizvisitsUM.html](http://www.eecs.umich.edu/mathscience/PPS/wizvisitsUM.html)]
- We served more than 400 teachers with our inservices, tech training, in-class science activities, and academic or career mentoring programs.
- Users browse more than 6.5 million of our Web pages per year, which offer access to
  - More than 300 science lessons [[www.eecs.umich.edu/mathscience//funexperiments/agesubject/subject.html](http://www.eecs.umich.edu/mathscience//funexperiments/agesubject/subject.html)],
  - Nearly 500 quick science activities [[www.eecs.umich.edu/mathscience/funexperiments/quickndirty/quickneasy.html](http://www.eecs.umich.edu/mathscience/funexperiments/quickndirty/quickneasy.html)],
  - Over 100 career presenters [<http://www.eecs.umich.edu/mathscience/exploringsci/presentationdirectory.html>],
  - 90 tours [<http://www.eecs.umich.edu/mathscience/exploringsci/tourlist.html>],
  - Almost 40 job shadowing opportunities [<http://www.eecs.umich.edu/mathscience/exploringsci/shadowdirectory.html>],
  - Reports on our past and current science clubs [[www.eecs.umich.edu/mathscience/scienceclubs/clubs.html](http://www.eecs.umich.edu/mathscience/scienceclubs/clubs.html)] and how to run your own [[www.eecs.umich.edu/mathscience/scienceclubs/startclub.html](http://www.eecs.umich.edu/mathscience/scienceclubs/startclub.html)],
  - Reports on various career mentoring formats [[www.eecs.umich.edu/mathscience/reachout/CarMen.html](http://www.eecs.umich.edu/mathscience/reachout/CarMen.html)] and how to replicate them [[www.eecs.umich.edu/mathscience/exploringsci/MenProcess.html](http://www.eecs.umich.edu/mathscience/exploringsci/MenProcess.html)],
  - Reports on academic mentoring programs [[www.eecs.umich.edu/mathscience/reachout/intro.html](http://www.eecs.umich.edu/mathscience/reachout/intro.html)] and how to create and organize them,

plus a variety of other resources useful for science outreach, career exploration, and community coalition-building [[www.eecs.umich.edu/mathscience/learningcommunities/introduction.html](http://www.eecs.umich.edu/mathscience/learningcommunities/introduction.html)].

- We provided extensive personal coaching to (and often created temporary Web sites for) people from nearly 30 groups in this and nearby communities who were beginning new initiatives with goals related to our own. [See Appendix D. 5. c. on page 72]

As this listing indicates, we often have difficulty giving a 30-second answer to “What do you do?” We do many different things, but all related to our mission and goals. We have been admonished in the past to “focus” and to do fewer things so that—presumably—we could do them better. We are extremely proud of how much we have accomplished without giving up anything that we thought was important to our mission. *The reason we have been able to achieve so much is that we did none of it alone.* Our partnerships are not in-name-only; rather, our partners contribute ideas, hard work, and modest funding to our joint projects. And our hundreds of university volunteers have been the structural pieces for which we provide the glue.



*Aarti & friend – science in the park*

## D. Values and Principles

You now have the flavor of what we do—hands-on science with kids, academic mentoring with teens, personal and career exploration with all age groups. While the forms of what we do vary enormously over time and from site to site, all of our programs have been animated by the same guiding values and principles:

- We believe that *anyone* can learn math and science. Some may need more time than others; some may need different ways to learn and to show what they know; all learn better experientially than by lecture and memorization. But *all* can learn—especially if they see relevance to what they are learning and if they are not handicapped by an assumption that they are incapable of learning it.
- Science is more than a collection of facts, theories, and results. It is a process of inquiry built upon observations and data. (Wording borrowed from H.R. 100)
- We believe that children and teens deserve to be viewed as individuals with intrinsic worth. They are worth an investment of time, energy, care, guidance, and love to help them become the full persons they potentially are.
- Students should learn science primarily by doing science. Hands-on learning helps young people to be active and empowered and responsible for their own learning—something they truly need in a society that seems to conspire to make them passive and subservient. It also enables the acquisition of deep understanding, rather than mere facts.
- An intergenerational and cross-class “learning community” recaptures a natural organizing framework we have gotten away from in our nuclear-family society and our single-age classrooms. Learning community benefits from the synergy produced by many hands and multiple perspectives engaged in the same enterprise. We are also more productive and effective when we abandon the ego involvement of “expertise” and really listen to others’ opinions. Learning community implies both voluntarism and equality of status: all are learners at times; all are teachers at times; no one is graded; learners bring their own motivation with them.
- Motivation problems can be alleviated (1) by small successes that overcome a fear of failure or an assumption of incompetence, and/or (2) by finding an instrumental value to difficult learning—such as fixing on a desired career goal that requires higher math skills, for example.
- We fail to attract and keep women and minorities in technical studies and fields because we focus too narrowly on the academic part of their work and their minds.
- Technology is a tremendously powerful tool for assisting people in discovering, developing, and reaching their potential, while contributing to society and its ends. If knowledge is power, technology is potentially the most democratic of doors to that knowledge. Never before in human history has so much information been so easily available to so many people.



*Katie, Kiesa & Elizabeth reporting to Kiwanis sponsors*

## II. What We Do and Have Learned

We have spoken at length among ourselves about what we need to communicate, to whom, and how, in this final evaluation. While we are bursting with insights and anecdotes to support them, it has been tough to organize them. We settled on the idea of presenting our findings according to major and recurring **themes**—but those themes are overlapping and interlocking. They resist a hierarchical outline and insist upon a more circular model, in which ones leads to and feeds another and is, in turn, reinforced by others. So, while we label and discuss them separately in what follows, each is just an aspect of a more organic whole, and there is inevitable repetition of ideas. Moreover, because we believe that the **voices** of participants communicate what we do with an eloquence and impact beyond that of any dry, organized reporting, we will recount those in a parallel track on the right.

We urge you not to skip them—they *are* the story!

### A. Themes

#### 1. *We are about community-building.*

We link generations, classes, and cultures in common enterprise. We do it not just because we can, or because we're so desperate for volunteers, but because we all need and benefit from that richness of acquaintanceship. It is the antidote for the inherently discouraging nature of our work. It can be downright depressing to see how our children live: how lonely they are, how needy, how deprived in social, academic, emotional, physical, and intellectual ways. But *together*, we can do so much to fill those needs, to show them how to fill their own needs, to fill the needs in ourselves that we did not realize were there. Older adults, with the perspective of decades and a natural concern over their legacy to the world, can inspire young adults to think beyond their own needs and desires. Young adults, who have yet to learn society's lessons about what "can't be done," help middle-aged adults overcome the inertia and helplessness common to those who have spent years bumping fruitlessly against the same barriers. Children and teens help all of us see that the world can be changed for the better one person at a time: maybe we can't "fix" schools or families or society in general, but we can literally save lives, who will go on to save other lives, and we can inspire others by our example to do the same, who will spread through society exponentially. We are convinced that true systemic change must start at ground level and spread upward and outward. Part of the Learning Community philosophy is that we are all responsible for helping our children learn—and they are *all* "our" children.

### B. Voices

#### **They need us. We need them, too.**

- Kiwanis mentoring coordinator

Look around at Monday's lunch meeting. Our organization [Kiwanis] is a tremendous and rich resource of adults who have life experiences, and time, to share with young people. If we can match them up with our kids, they can listen to them. They can help them get a little more perspective on their life. They can help them think about values, commitments, goals, options. They can care about them and maybe share some of the mistakes they made or the choices they made that could have been different. We need to match these kids with us. They need us. We need them, too.

#### **I sometimes wonder who I would be today without this experience. That scares me.**

- UM *Reach Out!* volunteer mentor

I came to UM being really selfish. I just cared about me, my grades, my major, my life. In the last two years, I'm nothing like the person I was. *Reach Out!* started out as a nice thing to do—but it became who I wanted to be. *Who I wanted to be.* Funny, until *Reach Out!*, nothing on campus really made me stop to think about that. That's sad. I

## 2. *We are about empowerment.*

Our organizational structure is looser and less hierarchical than people are used to; this is consciously intended to develop leadership and other personal skills, and to take advantage of the richness of ideas and depth of enthusiasm that stem from self-direction. We all agree on what our mission is: to connect many facets of the community in a common effort to improve the math and science literacy of all children, as well as to inspire, encourage, and support the aspirations of young people to pursue study and careers in science, math, engineering, and technology (SMET). But we need not prescribe or even agree upon the means of reaching those goals. As Peters and Waterman put it in their ground-breaking 1982 book, *In Search of Excellence*, we are “tight” on ends or expected results and “loose” on means and procedures.

*Empowerment of young adult volunteers.* In part, we choose to organize this way because it works so well: we often note that our young *Reach Out!* [[www.umich.edu/~reachout/](http://www.umich.edu/~reachout/)] activists have done more, and more ambitiously, than we ever could have thought to prescribe. And, obviously, we assume that there is no “one, right answer” or prescription for attacking the problems we deal with; if there had been, it would have been found and implemented long ago. There cannot be a simple answer because the nature of the world and of people are both complex and constantly changing; we must be just as flexible in order to succeed. For example, some of our volunteers wanted to take science “on the road” for an alternative spring break. We helped them plan and procure materials, and two groups went to Boston in 1997 and to Miami in 1998 to do hands-on science with disadvantaged children instead of taking a more normal vacation.

Another example would be the guidance given to our undergraduate science club coordinators. Program Coordinator Deb Hamann [[www.eecs.umich.edu/mathscience/reachout/Who/deb.html](http://www.eecs.umich.edu/mathscience/reachout/Who/deb.html)] provides them with a notebook of suggested themes for the semester, along with related activities for which we have assembled the needed supplies. Some site leaders use a lot of this, some parts of it, some none at all; but all do a great job! Those who “throw the book out” and plan their own activities do so because they have a vision and a passion about what they want to accomplish (usually in their last semester with us, when they are both experienced and determined to make a difference). Because they are guided by what they

learned to really care about someone else, and I saw what an impact these people and kids had on me. I became part of a real community on campus and in Ann Arbor. I sometimes wonder who I would be today without this experience. That scares me. Thinking about things deeper. Thinking about the future of not just me but our society. Well, I’m thinking so much more now, and it has a lot to be with this experience, I tell you.

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### **Teachers can’t do it alone.**

- UM mentor and site coordinator

I thought education and school was up to teachers and administrators. Now I see that our society has cast off parent, family, and community responsibility for education to just the schools. I never really thought about that until this year. We’ve talked about long ago when everyone learned so much at home, on the farm, from each other. I’ve seen how important it is to bring back together parents, communities, business, and community people to really take on educating kids. We all have a role. Teachers can’t do it alone. But almost everyone else really isn’t thinking about [this]. *Reach Out!* is helping lots of people and groups think about what we all have to do to teach our kids.

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### **One day I woke up.**

- UM student from a fraternity

I started this all [working with *Reach Out!*] thinking I was just being a nice guy, who was proving that by doing some service work. Then this struggle kept growing inside of me. And one day I woke up and saw that service is about who I am, who we all are supposed to be. It turned everything around for me—who I talked to and what about. Some thought I was crazy because I kept talking about my kids, what they said, what we did, and what they mean to me. For me, this is going to

have learned with us previously and the values they have clarified in *doing* outreach work, it always turns out just fine.

Empowerment works. But we also choose to empower them and let them go because of what that does for *them*: it makes them self-directed, adaptable, well-rounded, sensitive to nuance, open to new ideas, accustomed to collaboration, skilled at consensus-building, humble rather than dogmatic, and focused on results. This is a description of the kind of person we all want our children to become—and of the kind of citizen and employee demanded in a world where change is the only constant.

**Empowerment of children.** And empowerment is not just good for grown-ups. It is not simply that children are potentially much more capable than we may have thought; rather, treating them that way allows them to *become* more competent. Our science clubs don't just communicate the process of doing science, they use it as a metaphor for taking charge of one's life. For whatever reason, many children are very passive consumers of life. They need to be prompted to ask "Why?" and to actively think about how and why things happen. Whether they become scientists or not, this habit of mind will surely affect their lives for the better, if only because an understanding of cause and effect opens the mind to the whole notion of personal power and responsibility. If things happen for predictable reasons and they can alter the terms of an experiment, that means they can also take active steps to control their own lives—rather than living as powerless victims.

Youngsters have also gained immense poise and power from actively taking on responsibility in our programs—as science wizards teaching others and as Youth Task Force members researching a community problem and reporting on it to their neighbors. We have never forgotten that *every one* of Pontiac Owen School's first group of wizards received AAA Awards for improved attitude, achievement, and attendance after their training. The first Youth Task Force on the Environment [[www.eecs.umich.edu/mathscience/YTF/ytf.html](http://www.eecs.umich.edu/mathscience/YTF/ytf.html)] investigated the problem of leaking underground tanks on city-owned property and reported their results to the Pontiac City Council. Our young people can do more than we typically imagine—and, in the doing, become more capable still. Perhaps we have forgotten how much genuine responsibility children used to exercise in an agrarian society; they are just as potentially capable today.

be a way of life and it will make me and my own family something so much more that it would have been before. I guess a key was how self-ish I was, and I think most of us are. *Reach Out!* makes you finally hit a wall and see that about yourself and you deal or quit going out there with your kids!

**I was really offering my kids me.**

- Science club mentor

I thought I was offering my kids fun science projects. One night I went home and saw that I was really offering my kids me—and they were giving themselves back to me. They shared so much about their lives, so openly. I learned so much about them. I saw that I was really living a pretty superficial life. That made me really sad and then I got mad, too. I need my kids. And my kids need me. We need each other, you know? I hear them talk and sometimes I share things I wish I hadn't done when I was younger. I'm hoping they can learn from me. It's like everyone says: "I'll learn from my own mistakes, thank you." Well, I think I might have made some better choices if somebody had really shared their mistakes with me and what happened—not preaching at me or anything like that, but just sharing. Well, I think I am doing some of that with my kids. And I like to think it may help them. I really care about my kids. Who would have thought that last fall? Not me, but I do.

### **Individual Children Served, 1995-2002**

<b>Science Clubs</b>	<b>1,174</b>
<b>Science Days</b>	<b>303</b>
<b>Science Wizard Training</b>	<b>24</b>
<b>Summer Camps</b>	<b>37</b>
<b>Career Clubs</b>	<b>21</b>
<b>Career Workshops</b>	<b>26</b>
<b>Career Mentoring</b>	<b>28</b>
<b>Academic Mentoring</b>	<b>804</b>
<b>Summer Courses</b>	<b>14</b>

(See note on inside front cover) **Total: 2,431**

*Empowerment of teens.* Teens, too, grow tremendously when empowered. While many of our high school mentees have appalling deficits in basic skills, they all need much more than subject-matter tutorials. They need help with analyzing their motivational problems, with learning to set study schedules, with devising strategies to get out of the deep holes in which they find themselves. Many have no clue, for example, how to deal with being in over their heads except by denial: ignoring homework, cutting classes, and flunking out. They need to be led through determining what can be salvaged, and negotiating with teachers and counselors over the best step to take next: intensified tutoring, makeup work, alternative assessments, changes in sections or entire classes. They need to become convinced that they are not just victims, that there are things *they* can do to improve their situation. Moreover, they need to learn that *only they* can rescue themselves. Mentors can diagnose and work on gaps in basic knowledge, can provide hand-holding and confidence-building, but the students must internalize the fact that no one can pour knowledge into them. They are the only ones who can guarantee their own learning. This realization transforms them in a way that no amount of factual knowledge about science ever could.

A presenter at one Coalition meeting reported on the profound effects of the Trailblazers program, which matches Ann Arbor high school students with elementary students for ongoing mentoring, on the teen *mentors*. Partly inspired by that, we welcomed teen volunteers to work alongside our college volunteers. They have done this with great success at three of our science clubs and as counselors in our Camp Discovery in the summer.

Our intergenerational community has been a source of great strength and synergy. The natural idealism and optimism of the young adults in *Reach Out!* frees their elders from the cynicism and tendency we have to see only the roadblocks to a new endeavor. Our child and teen “clients” are encouraged to take responsibility for their own lives and to reach back to help those younger than they. In doing so, they

**I think all of our young people are what they call “at risk.” We need to take time for each other. I guess we older people have some value.**

- Kiwanis career mentor

They just need someone to be there. To listen. To care. To ask a few questions to get them thinking about who they are. They need our time. They need to hear that they are special and worth something. I have learned that parents are real busy. Children that I would have thought had things, you know, a nice home and nice parents, and didn't need our time proved to need us just as much as other children we think are needy. I think all of our young people are what they call “at risk.” They are at risk of not having people steady in their lives to be there, to hear them talk, to help them know they are really valuable to all of us. They don't know where they are going, and some don't know where they have been. I thought to myself, how much can I do in just a few weeks? Well, I can tell you we can do a lot in a few weeks. I think the parents learn from us, too. I think they see us—strangers, you know—taking time out of our lives to go to the schools to just be there for their children.



*Some summer algebra teachers & students*

become leaders and surprise their parents, their teachers and, probably, themselves with their competence. Older people (we have many retired but take-charge, high-powered volunteers) are encouraged to let go of the leadership methods familiar to them and to adapt to the teamwork-oriented, collaborative style that works for cutting-edge corporations today. They learn firsthand how capable and responsible the young can be when allowed to exercise some control, and how many of their own instinctive reactions and methods were based upon assumptions that may not be true. We all grow so much that sometimes we find ourselves unable to communicate with others who have not had our experiences: “She is so far behind the power curve on this that we can’t even talk about it; she doesn’t have the vocabulary.” This may sound condescending or arrogant, but it is rooted in the reality that people cannot understand or answer questions which are in a developmental sense too far beyond them (more about this below). So, we wait and watch and bring people along slowly. We let them go and free them to make the same mistakes we did—not because it is the best way to learn but because it is the *only* way. Empowerment is not a luxury; it is the necessary precondition to becoming our best possible selves.

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### ***3. We see outreach work as a developmental process.***

Just as Piaget delineated stages of intellectual development and Kohlberg of moral development, we see a series of stages through which all of our participants must pass, in an inflexible order. Some will move through them faster than others, and built-in time for reflection and discussion with others will accelerate the process, but stages cannot be skipped altogether. And people on one developmental plane simply cannot “speak the language” of a stage too far ahead of them. For example, as Jean Piaget and his followers documented, for a baby at a certain level of intellectual development, when an object is placed under a cover right before her eyes, it no longer exists—because she can’t see it. At a later stage, a young child will be convinced that the water he pours from a tall, skinny container into a short, fat one is now *less* water—because he is not yet able to grasp the concept of conservation of matter. Lawrence Kohlberg has similar fascinating examples to offer of how people cannot grasp ethical concepts too far ahead of their developmental level. The point is that we should not be discouraged to see the same pathway of growth traversed by one person after another, with each of us seemingly unable to

They might think, am I taking time to just be there for my children? This person is. And I’ve talked to my students’ parents. They need mentoring, too, I mean someone maybe a little older to listen and to care. We are all so busy, you know. We need to take time for each other. I guess we older people have some value, you know, I mean I think that our young people can gain something from us, and their parents, too.

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### **I see things aren’t just black and white.**

- Science club mentor

I got so mad at schools and teachers and parents last semester. I mean, why aren’t they teaching my kids science, and even reading? This thing just gnaws at me and I wanted a simple answer. I guess somebody to blame, you know? But now I’m seeing everything is so much more complicated. I mean my kids, they are struggling to just keep going. Their mom is struggling to just keep going. Did she ever have support? Does she know how to help her kids? I don’t think so. I took for granted so much of what I had growing up. Then the teachers ... I mean, my kids are so far behind that how can she deal with them and 20-some others? Then my kids have these attitudes and I can see why. I think they feel stuck and lost. They can’t catch up and they know they are behind and they have no way out. And they’re *kids*, you know? They can’t handle all this pressure and they don’t have any help to make things better. My dad says I’m just growing up and seeing things aren’t just black and white. I don’t know, I just know my kids are smart but I worry about their futures. And I can see that we have to get in there to help them out and to help their teacher out and their mom out. I’m still mad at what is going on and how we all are letting it happen.

learn from the mistakes of others. *Telling* them what we *know* is not enough to make the light bulb come on in their heads—they have to go through what we did to get here. The process looks something like the following for the typical volunteer.

- They begin warily (Are these guys for real?) or for the wrong reasons (White Knight, résumé-builder, do-gooder).
- Once out in the field, they quickly experience horror at the low level of academic functioning of their kids. They are surprised at the depth of misconception or ignorance from which many see the world.
- Next, they feel anger and frustration. (This is terrible! We need to *do* something!)
- They engage in the blame game. (The teachers are incompetent! The parents don't care! The kids just don't try!)
- Finally, some internal switch gets thrown. One can almost hear the “click” as they realize the complexity of problems, grasp the interconnectedness of lives and roles, confront the shallowness or inauthenticity of their own previous social commitments, and reach the conviction that we are all responsible to take action for change. They begin to see shades of gray, to reconsider their earlier verdicts. (Wait a minute, these kids aren't stupid. They know more than their test scores show. I may not be able to “fix” a kid or change the system, but I can help, with just encouragement and support.) Now they are in the passionate, True Believer stage: wanting to give testimony and to convert everyone around them.
- The final step, which volunteers are not always around long enough for us to see (they graduate and leave the area, but continue to communicate with us by e-mail), is the transformation from an impatient and sometimes rude passion to a quiet conviction that we believe will last a lifetime. Having become explicitly aware of the developmental process in themselves, they know that others cannot be rushed from the beginning to the end, that they must go through all the stages personally and develop insight from experience, that modeling can teach better than proselytizing. They are, in the end, incredibly wise and mature for their age, prepared to be remarkable spouses, parents, employees, citizens, community leaders.

We have noted, in previous progress reports, the same sort of incremental conversion processes in the adults at sites where we work. Teachers, for example, will tend to be defensive and wary of our high school mentors at first, since their very

**There's a lot going on here besides science, even though that is wonderful all by itself.**

- Coordinator of a subsidized housing community center

Your program is very important for our kids. Many of them, I think, just don't believe they can do science, or be good at it. I really think that some of them are already scared of math and science. I hear their parents, too, and they say they aren't good at math and science. I watch the kids every week. They love this. They have fun. The university students are so wonderful with them, too. There's a lot going on here besides science, even though that is wonderful all by itself. I had this gut feeling myself that science was lectures, books, studying. Watching this going on all year has changed my ideas about science. In the middle of this fun and sometimes chaos, our kids are learning a lot.

**I like trying things to see if they work.**

- Child in science club

You have to be open. I mean you have to be open to try stuff that is, well, different and sometimes kind of hard. I like trying things to see if they work or fit or do something. We do a lot of that here. I miss it when we don't have [science club]. Sometimes we run out of time, too.

**The beauty is we can work with each other's kids and grandchildren.**

- Kiwanis career mentor

I think we have to start out slowly. First, people have to see that they really have something of value to share with kids. And some have to get beyond being a little intimidated, well maybe even afraid, of being with teens. But I think that now that we have people who have been career mentors, they can tell the others about it, how it meant something to them and their kids

existence is an implied criticism, and teachers are now accustomed to being treated as societal scapegoats. Eventually (and it takes a while!), they learn to trust and to appreciate mentors as collaborators. We become team members, all pulling in the same direction.

Adults at the schools and community sites hosting our science clubs are also skeptical at first: the activities are too messy, the children are too loud, it looks too much like play and not enough like learning. They assume that the learning process should be orderly, lecture-based, and focused on factual knowledge and recall.

I didn't see any purpose for what was going on [at science club]. I mean, all this mess and talking and carrying on. Then I started to thinking that the kids really like this and the UM people, they like this, too. Sometimes I jump to things too fast, I mean, I think now that the kids are getting a lot out of this. They come and tell you about it, like what they are learning or making. I couldn't believe it when they told me about [dissecting] the cow eyes. I never thought they'd be doing something like that.

- Mother of a child in a science club

Our aim is to teach children how to think like scientists, to be unafraid of science, to have confidence in their own ability to do science. While they can't be rushed, the adults do come around to appreciating that the change in their children's motivation, interest, and confidence will be important to their future learning, and that conceptual understanding based on concrete experience is more valuable than rote recall of facts.

#### ***4. Outreach is positively transformative for the mentors.***

As best we can reconstruct it, we switched from tutoring and short-term-project models to long-term mentoring for the sake of the children and teens we were serving. Their needs were so great that they obviously required a more committed intervention. We were pleasantly surprised—after fearing that an up-front commitment for mentors to come weekly for an entire semester would be too much to ask—to find that most enjoyed their volunteer work much more and became very faithful about fulfilling their commitments. The relationship inherent in mentoring was very rewarding to them, as

and how it didn't take up too much time. I know that my own boys don't really want to listen to me or their Dad on things like careers and where they are going, but kids will listen to other people. That is the beauty of this, we can work with each other's kids and grandchildren and be there for them, share with them, help them really think about who they are and what they can do.

#### **We needed someone else to help him.**

- Parent of career mentee

[The career mentor] made such a difference in our son's life. He was so moody and just didn't seem to care about much of anything. And he was drifting away from us and didn't want to talk to us. And, I'm sure, he is just normal, thinking that we (parents) just don't get it and understand him. We needed some other adult to be in his life. [The mentor] helped him see it was okay to be different from other kids. He helped him see that he could be an entrepreneur and what that would mean. He introduced him to other people who could share how they planned and started up a company of their own. He made him think, too, that to be an entrepreneur, you have to be self-motivated, a self-starter, stay on track with your



*2000 Reach Out! Site Coordinators*

well as to their mentees. We all need accountability in our lives, and mentoring provides a context for learning that—we depend on one another as coordinators, as mentors, as site teams. These teams include partnerships with older volunteers like Si and Mike [www.eecs.umich.edu/mathscience/reachout/whoaux.html#si], who offer a wisdom and perspective often missing from our lives. They help us to see the bigger picture and the larger impact we are having, to realize that we are all role models and can all learn from mistakes and choices we made when young.

This raises the deeper unexpected benefit to the mentoring process for college-age volunteers: it spurred and accelerated and shaped the kind of developmental changes that late adolescence and young adulthood should be all about:

- Who am I—*really*—underneath the facade? Is that who and what I want to be?
- Am I at UM because I’m “all that,” one of “the leaders and best”—or did I have a lot of advantages and support that others lack?
- Can I work with others very different from me (both children and fellow volunteers of different cultures and generations)?
- Do I have any responsibilities to others and to my community and society?
- I want to do well here in college, but it’s not enough anymore; what is missing?

These “life passages” should be the essence of education, as opposed to training or schooling. Part of The University of Michigan’s mission (see Appendix B, pages 62–65) is to “develop leaders and citizens who will challenge the present and enrich the future.” This mission acknowledges that the university’s purpose is broader than the production of people with employability skills—because human beings are more than robots. Yes, we have a deep need to be functionally competent and productive, and we would prefer to be creative and imaginative about it. But there are entire domains of human potential beyond those, what William Spady calls “collaborative” and “constructive” living:

Collaborative living is the wellspring of emotional development, human bonding, and the formation of stable and constructive social units. It is both the source and the expression of our deeply felt sense of connection, belonging, loyalty, and love toward others. [It is essential] because without it life can be little more than an isolated,

### Individual Mentors, 1995-2002

Academic Mentors	779
Science Mentors	503
Career Mentors	24
<b>Total:</b>	<b>1,306</b>

(Ongoing, not one-time service; counting each person again for each new season of volunteering)

goals. It’s like this all turned and turned inside of him, and we saw a real change. He woke up, I guess. I mean, he started taking care of himself, doing better in school, seeing he had to get going to get where he wants to go. And he has somewhere he wants to be in two years, now. He even talks to us more and about what he can do, what he will do, what he is doing. I’m so thankful for this program and for [the mentor] taking time for my son. He even said that he thinks this is the best thing there has been for him in high school. He thinks all kids need this. I think he is right. I can’t do it. We needed someone else to help him.

#### **We need community and service. We need it.**

- UM mentor and, later,  
site coordinator

I see for us [UM students] how much *we* need many of the same things— like people letting us come to work to see what kinds of careers we could get into if we are in this or that major. We often would really benefit from a community person mentoring us. Our professors don’t know very much about the world of work, just like our kids don’t. How many of us are spending 60, 80, even 100 thousand dollars on a degree [when] we really don’t know what we will do with it? And what would we have gone into if we had had the chance to really explore what was out there in middle or high school? No, education, I think at all levels, has to be more of a community responsibility. Everyone

alienating, often hostile, and indifferent array of experiences.... [Those who live collaboratively are willing to] take the interests and viewpoints of others fully into account in carrying out common endeavors.

Constructive living is the pathway to individuals and societies becoming truly “civilized”—that is, where one’s endeavors are positive, useful, and valuable to others. It is both the source and the expression of our desire to make the world a better place.... [It is essential] because without it life becomes little more than an individualistic pursuit of personal gain, status, and advantage with little regard for its impact on others or the welfare of humankind.

These are the dimensions that are often missing in the lives of college students and the areas in which they desperately need opportunities to develop. There is little of a collaborative or altruistic nature required or encouraged of them. Although group projects are now routinely expected in school settings, students are given little guidance in *how* to collaborate. The overall atmosphere on campus is extremely competitive—which is only natural in a system where students are graded in relation to one another’s performance. No wonder they are starved for and refreshed by fun, non-judgmental, noncompetitive human interactions. No wonder their spirits are revived by the call to be more than they have been—in a sphere outside of academic performance. They want to be whole.

One reason they learn and grow so much from their volunteer mentoring is that they experience diversity up close and personal, on an ongoing basis. Outgoing UM Provost Nancy Cantor noted (May 2001) that “most of our students come to campus never having had sustained contact across the boundaries in our country of race and ethnicity, class, and geography.” *Reach Out!* provides all of that—out in the community and within the organization’s membership. It offers practice in “learning to speak one’s mind, to give and to receive criticism, to see the world through another’s perspective, to change one’s mind, ... to live and work in a pluralistic society”—all “valuable, though intangible” aspects of a high-quality education, in Cantor’s words. In doing so, we are part of the university’s “contribution to civic engagement and democracy beyond our campuses.”

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### **5. Math and science aren’t everything.**

While we are about the promotion of math and science literacy, we will not look at it or at people in isolation. We deal with the whole person. Telling a child failing in school to work harder is not the solution, because lack of effort is not

thinks they can drop off kids at school or college and whatever they do to us will educate us and prepare us for something. That’s not true. We need community and service at all levels. Not just to be nice or because somebody thinks it’s “good.” We *need* it. And I mean both the kids and the adults. It’s being human. It’s caring and being a part of each other’s lives.

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### **I got mad. It looked like they were just playing around.**

- Mother of child in science club

I kept picking my daughter up and I got mad. I mean, it just looked like they were playing around. Then this UM person told me to wait a minute, to ask my daughter what is going on for a while. She told me that kids learn by having fun and doing things, with their hands, with trying things out. I guess I thought she’d get more school or something. I’m talking with her, though, and she is picking up things—words and ideas that are new. She really likes science club. She really does.

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### **He was a steady thing in her life. Frankly, we didn’t have anything steady going on at home then.**

- Mother of a career mentee

My daughter was so down on herself, and we were going through so much as a family. The divorce and moving and everything just came down on all of us. I know I was struggling just to keep going myself, and I just wasn’t there for her. We were all hurting. [Her career mentor] came along in her life at just the right time. She opened up to him about so many things. He was a steady thing in her life and a grown-up that she knew, I guess, she could confide in. She knew he’d be there every week when he said he would. Frankly, we didn’t have anything steady going on at home then. It’s really hard for me to put in words what he has done for all of us. He is so calm. He listens. He cares. He

the only problem. Lack of confidence, lack of relevance, and lack of assumed basic skills are much more important factors.

Our conviction about the overriding importance of affective factors to academic performance is rooted in our experience with *mentors*, as much as with their mentees. Our university student volunteers are already known to have been selected for academic competence and success, but they don't all succeed here. Why? We hear the same things over and over:

- I don't know why I'm here, or why I'm studying [major].
- I can't get motivated to study, even though I could probably do the work all right.
- I'm so uncomfortable and unhappy here, but I don't know why or what's missing.
- I keep telling myself to focus, to work harder, but it's hard when it seems so pointless.
- They think I'm smarter than I really am; I'm in over my head and don't know what to do except to try harder—but that's not working!

They are at loose ends because they have not done some of the tough, non-school-related work of adolescence: reflecting on who they are and want to become, establishing their own identities. Like the children and teens with whom they work, they often have not established what psychologists call an "inner locus of control." They have habitually worked hard to please and meet the expectations of others, but they don't know what *they* want out of life. Until they do, it becomes increasingly difficult to maintain that high school habit of delaying gratification and working hard for a future goal. After all, they've made it to college, the Holy Grail of their youth. They find it less satisfying than expected. Now, they have a great deal of personal freedom, living in an exciting college town; many don't even have to work for pay in order to support themselves. Yet, they have not learned to exercise that freedom in healthy, productive ways, since they are still being buffeted by the expectations of others—to "succeed," to be popular, to be cool, to be "leaders," etc. Many are stuck in the superficial high school leadership model of being club officers or doing résumé-padding "community service." A simply stunning proportion of girls come here to study engineering with little idea of why or of what it is. While they are probably capable of handling the actual class work, they are perfectly lousy at dealing with the crisis of confidence and the qualitative differences inherent in working in a majority-male environment.

didn't have some other motive, you know? I'm sure he didn't know what was coming when he started working with my daughter. I don't know if he knows even today what a source of strength and hope he was for me and her, but he was. And he wasn't anyone like who I would have thought could come into our lives and help us. This may sound odd to you, but I really think God sent him to her and us. It was just too crazy how this happened. It had to be Him. I was so down on men and she needed a man in her life, a man to care and listen and hear her. [Her mentor] did that.

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**My whole idea got turned upside down.**

- Pioneer High mentor

I tell you, my whole idea about who can learn and what teaching is and all this school stuff got turned upside down this year. And I saw that I wasn't just being some nice person by helping a kid with math. I got to seeing that I had a responsibility to help her learn and to feel good about herself and to deal with her teacher and the tests and homework. I saw that she was smart. I saw that she just didn't learn the way the math was being taught. I can't tell you how crazy that was for me at first. I did fine. My friends did fine. I bought the whole thing that some kids just aren't as smart as me or can't learn math. That's a lie, you know it? I do. Things have to really change so kids like mine can succeed. And I think we [*Reach Out!*] are a part of that change. It's going to take time, but I think we are making a difference, for sure with *our* kids, but I think in the whole education business, too.

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**I have to be what I say I am.**

- Academic mentor, chemistry major

I thought I was this moral and good person. Sometime last semester I had to face the facts: I said and

Which leads to ...

**6. We fail to attract and keep women and minorities in technical studies and fields because we focus too narrowly on the academic part of their work and their minds.**

We have reams of anecdotal evidence on these kinds of problems, but the point is that their academic performance problems are rarely rooted in academics. The reasons for failure or abandonment of a major are not always—or even most often—related to academic preparation or support, inherent capacity or aptitude, and amount or efficiency of effort. Yet these are the aspects most often, if not exclusively, addressed by programs intended to bring more women and minorities into technical fields. We fail to look at the *whole person*, who has personality components beyond traditional academic capability and performance. Although it was not our original objective, one of our most profound findings has been that doing outreach work addresses these other areas for our volunteers; it fills holes in their lives and their psyches; it energizes and motivates and matures them. When they do poorly at the university, it is often because of what's missing from their lives. As one put it,

We arrive here having never done anything for our families or our communities—burnt out on school, school, school. It is so refreshing to see life outside of college in the community. Little kids keep you happy; giving back fills you up and keeps you going. You know, we *are* more than our studies.

- UM undergraduate

Any middle school teacher could diagnose the conflicted priorities here! They are being expected to concentrate on study when, frankly, other things are more prominent on their radar screens. Unfortunately, they are not really clear about the problem. They just know that they can't seem to make themselves

thought I was this really caring good person, but what did I do with my time and life to be that? Not much. [My mentee] got chemistry okay, but more, she and this program made me see that I have to be what I say I am. Nothing has really taught me that till now. This is really making me think more about my spiritual life, and my just-regular life. Do I really care? I think I'm starting to and it sure is who I want to be. I get really down on people who say they are spiritual or this or that and then really aren't in their everyday kind of lives. I think they are hypocrites. Now this is way funny, but *Reach Out!* made me see I was being a hypocrite too. I sure didn't like that. It was a big thing, you know? It was good, though, too, because then I acted on this. I made so many excuses why I couldn't get involved awhile back, then I just did it. I'm so glad. I mean I am really glad. Having a friend who kept bugging me to do *Reach Out!* was good for me too, but I wanted to shoot him last year! My Mom always says you can talk a good line but do you live that good line? I think I know what she means now.

### UM Student Volunteer Affiliations, 1995–2002

Abeng	Interfraternity Council
African Students Association	Juggling Arts Club
Alpha Chi Sigma	Kappa Alpha Theta
Alpha Delta Pi	Marching Band
Alpha Kappa Psi	National Society of Black Engineers
Alpha Phi Omega	Omega Chi Epsilon
Alpha Sigma Phi	Panhellenic Association
Arnold Air Society	Phi Sigma Pi
Black Pre-Medical Association	Pi Kappa Alpha
Black Student Monthly	Pre-Med Club
Black Student Network	Society of Automotive Engineers
Caribbean People's Association	Society of Minority Engineering Students
Circle K	Society of Women Engineers
Eta Kappa Nu	Taiwanese American Students Association
Filipino American Student Association	Tau Beta Pi
Golden Key Society	Theta Chi
Hindu Students Council	Volunteer Computer Corps
	Women in Science & Engineering

study the way they used to—because they are ready to be *more* than students. So, what do *we* do? Nag them to study more! How many of us have told our own teens not to get a potentially distracting job, because “studying *is* your job”? They may not realize it, but they yearn to be whole people. Our entire system seems designed to make them even more self-centered than is normal for their age, when they really need to be brought *out* of themselves and to think of others. They are becoming adults; why would we want to keep them in blinders with a narrow focus on just their own “thing”? Society needs *all* of their gifts and talents.

Almost paradoxically, we find, over and over, that the human connections built in the mentoring process actually make them better students. They are so relieved and “made whole” by developing empathy and concern for others that they are freed and inspired to study for their own, internal reasons.

I thought I was unhappy because I was doing poorly in classes. Now I think I was doing poorly because I was unhappy. It’s so much easier to work hard now!

This syndrome—wherein aptitude and ability cannot seem to overcome motivational problems—appears to surface more often in our engineering undergraduates. We are not certain whether that is a reality or just an artifact, since so many of our most involved volunteers come from that group. If it is true, it may be partly related to the mismatch between student and major that those who feel “pipelined” have repeatedly reported to us. It may stem from “climate” issues, since most of the complaining population is female and/or minority, and the College of Engineering has recognized a problem exists for these groups. But, we suggest, it may also be related to the tendency of this most technologically savvy college to rely upon “virtual interactions.” As UM Provost Nancy Cantor put it in a May 2001 speech, “dependence on social technology ... often breeds isolation.” It can undermine “the social consensus building that cements us together as a community.”

Plainly put, our young people are lonely, and when they’re lonely, they aren’t the best students they could be. Attending to one problem also addresses the other. When you consider that the mission of the university is to produce well-rounded, competent citizens, it makes perfect sense to embrace this strategy for bringing young adults out of themselves

**I thought I was going to give more than I got.... I’m so different because of my kids.**

- Science club mentor

This service thing was pretty phony before in my life. I did stuff at high school so I had it for my résumé, you know? Then I came here and thought I better do something here. And my parents were telling me I should, too. I’m so glad I got hooked up with *Reach Out!* I’ve been with my kids for two years. I don’t know how to put it, but service to me isn’t a choice anymore. And I thought I was going to give more than I got when I did service. That just isn’t the way this all works out. I’m so different because of my kids. I have stories in my head about so many times we did things, said things. These kids are going on with me in my life. Their words come up in the weirdest times—they really changed me. I told my mom that I’m more “real” now. Do you understand what I mean? I think that *Reach Out!* will be the really big thing that I think about when I think about being here [at UM]. And I know that I am closer with people I’ve met here than in the other things I’ve done. I think



*Science at Bethel AME Church*

and assisting them in seeing their place in the broader society. That it improves their scholarship and keeps them here, as well, is just a bonus.

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**7. *Science and math outreach cannot and should not be more of the same thing that is not working well in schools.***

When we see the shallowness of understanding and the vast gaps in knowledge and skills in the children and teens with whom we work, our first impulse is to spackle those holes with a thick layer of facts. But, almost surely, they have already been exposed to what they should know—they just haven't "gotten" it. They need a more engaging, less intimidating, truly hands- and minds-on approach to learning. We agree with the assertion of Nobel laureate physicist Richard Feynman that it would not matter if we did not "cover" every aspect of science, provided that children were given the guidance and the opportunity to *think* like scientists. Our science club model is built on the idea of communicating the *process* of science: observing, hypothesizing, experimenting—tapping into the natural curiosity of the young.

We have forgotten what schools are for and how people learn. The old idea, which we still take for granted in everyday life, is that people learn from experience. Everything you do leaves its mark on you. The new idea, which dominates education and business, is that people learn by acquiring information.... The failure of the information acquisition approach is that the rote learning of facts is the most difficult way to learn and the most common cause of forgetting....

The learning of skills and the acquisition of knowledge will follow from the development of interest in a subject. Forcing anyone to learn skills when there is no interest in or familiarity with the subject usually results in permanent failure and antipathy.

- Frank Smith, "Just a Matter of Time"

We aim to pique interest in scientific questions, to build confidence in the ability to investigate like a scientist, and to facilitate the deep understanding that comes from experiential learning.

Learning is about doing, and doing leads to learning. Learning is a change not only in understanding/meaning, it is a change in our capacity to do something with that enlarged understanding. This ability to "do" is called competence and "performance." Performance and understanding are intimately interconnected in a chicken-and-egg relationship.... Just think about playing a musical

some of us will keep up with each other, too [after we graduate].

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**I am beginning to really, really figure out what matters to me.**

- Junior engineering student

Who ever asks you to think about your convictions? I don't think I've ever really had someone corner me and make me think about that. But that happened for me this year. I started to ask myself in October just why I was going out to Hikone. I had this talk with myself, asking myself really hard questions. I think I am beginning to really, really figure out what matters to me, my convictions, what's important in my life. They say it isn't a dress rehearsal, but I'm really thinking about my life now. My kids have done that to me. I hope they do this someday so they will ask these big questions about themselves, too. I really needed this experience, but I would have told you I didn't last year!

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**This experience is changing me and I thought I'd change them.**

- Science club mentor

I didn't think I was racist or, I guess, prejudiced. I don't even like to say that out loud now! Well, anyhow—no, not me. But I'll tell you now I was. And my parents were, too. That made me really think about things, too. I really never knew any black kids before *Reach Out!* And I have to say I was a little scared going out there [a subsidized housing site] at first. That made me really uncomfortable about myself. Service. That is a big word. Everybody wants you to do service—but why? This experience is changing me and I thought I'd change them. I'm dealing with what I used to think about blacks and people who lived in low-cost apartments. There I said that. I don't like it that I didn't think about this before. I am now. My kids aren't very different from me when I was a kid. But I had

instrument.... There's a constant assessment and feedback process going on that leads to changes in behavior and in understanding why those changes are necessary. Then put that instrumentalist in an ensemble ... and the complexity of the doing/ assessing/ understanding process gets enormous. The bottom line: thinking (i.e., abstract mental processing) is a very narrow slice of what learning is and a limited way of promoting it, Doing, on the other hand, is a tremendous catalyst for learning.

- William Spady, *Beyond Counterfeit Reforms*

### Science Activities by Community

	No. of Clubs	No. of Sessions	Total No. of Kids
Ann Arbor	47	342	3,964
Pontiac	8	131	759
Ypsilanti	36	220	3,174
Other	4	14	448
<b>Totals:</b>	<b>95</b>	<b>707</b>	<b>8,345</b>

Note: counts each child for each session

#### 8. We take accountability seriously but define it differently than others may.

As noted above, we attach great importance to our responsibilities to one another within our partnerships. Both our conviction of the importance of our work and the strength of our relationships impel us to justify the faith placed in us. That is why, with little supervision and few formal requirements regarding oversight, we all work more hours than we are paid for and make certain our responsibilities are covered by someone else if we cannot meet expectations alone. We believe that we are extremely accountable to everyone with a stake in our work, *but* we consciously buck the trend that equates “accountability” with numbers alone.

We do document in a traditional, numerical way some aspects of our programming. We track numbers of volunteers and child or teen participants and numbers of times they meet. We track trends, such as the tendency to have fewer or smaller groups that meet more often over a longer period of time. We collect copious affective data: feedback on attitude changes and moments of enlightenment. We trace interconnections among people and programs that indicate a luxuriant growth of learning community.

We do not set such “benchmarks” for measuring success as

- $x$  number of students raised their grades by  $y$  decimal points
- $x$  number of middle school students took algebra
- $x$  number of students increased their attendance by  $y\%$
- students who had participated in our science clubs had science MEAP scores  $y\%$  higher than classmates who did not
- $x$  number of participants went on to successfully major in SMET fields in college

Why not? There are at least three answers.

- (1) We do not have legitimate access to most of this data,

these advantages that they don't. Do they deserve to miss out on what I had? No. Who will give them the opportunities I had? It has to start with me. Service. I'm really thinking about that now and frankly, I didn't really before.

#### It was a chore for a while and I resented it, to be honest. Sometime, it all changed.

- Engineering student

I started *Reach Out!* so I could get my service requirement done for *HKN*. I hate to even tell you that now! But that was my motivation. I was feeling like I *had* to volunteer to get what I wanted. Forced to do it, I guess, and even mad about that. Why I chose to do *Reach Out!* I still don't know. I guess because a friend of mine wanted to. I'm so glad I did this. I want to be one of those people who is known for helping other people, really doing it, not just talking about it. After a couple of weeks, I sort of gave up—this was part of my schedule and I had to block out time to go and things like that. It was a chore for a while and I resented it, to be honest. Sometime, it all changed, and I tell you I couldn't wait to go see my kids every week. Service requirement. Don't you think we all should have an internal one? I mean, shouldn't this be something we all just want to do? It sure has made me like myself more and I have met people I really like. We have this thing in common, I guess. Before, I had just social stuff

which is protected by the Family Educational Rights and Privacy Act. School districts do have access to some of this data, and can certainly collect and disseminate it (within prescribed limits), if they choose to do so. For an earlier incarnation of our coalition based in Ypsilanti, the public schools did collect data on participants in a church-based Opportunity Center, which showed noticeably improved grades and attendance, as well as decreased discipline referrals.

(2) We are reluctant to appear to be taking “credit” when there are so many other inputs that may be responsible for the results. Children and their lives are much too complex to allow for a post hoc, propter hoc kind of conclusion about their achievements. Asserting that our programming is responsible for any good outcomes would undermine trusting relationships with our partners. Our school partners have shared repeatedly that they appreciate the variety of interactions and people, over a continuing span of time, that we bring to them.

(3) Although we would love to follow both our mentors and our mentees in a longitudinal study, much like that used for Head Start, to see the long-term impact on their lives, we have nothing approaching the resources that would require. We also lack the expertise and resources to do a more modest but valid study of the important—but not readily quantifiable—effects of our programs on both the served and servant populations. By this, we mean the changes in attitude toward science and math, in perception about who can do well in these subjects, in sense of civic responsibility, in feeling of power over one’s life decisions, and in knowledge and perspective to make such decisions wisely. (Anyone reading this who is able and interested in conducting such research will have our full cooperation!)

Finally, however, we must admit that we are wary of a model of accountability that pretends that the things that are easily quantifiable *are* the achievements, rather than some rudimentary indicators of possible progress. If you believe, as we have previously noted that we do, that real learning should be demonstrated by performance—that is, by applying one’s new knowledge—then you will be suspicious of achievement tests that are not performance based. There are good tests out there (the Michigan Literacy Progress Profile is an outstanding example, and we eagerly await the math counterpart still in development), but more often than not their results cannot be

going on, pretty much. And my kids are great. They really are. And they are so smart. I didn’t think they were at first. How dumb was I, huh?

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**I like who I am choosing to become.**

- Pre-med student

I look back to last year and I can’t believe how I was so on autopilot. I was all locked up in my box and what I did and it was all about *me*. My boyfriend tells me I’m not the same person anymore and we both like that. I’m hoping he will come with me and work with kids next year. I thought I’d change my kids’ lives. They’re changing my life. And I like who I am choosing to become. They rat on me, I guess. *Am* I that nice person I say I am? Do I really care about other people? I thought I’d be this nice person in Peace Corps or something else later on. I’m being a nice person right now. I like who I am right now. *Reach Out!* has really helped me.

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**Something really sunk in: my gosh, I’m not living up to my word. And somebody needs me.**

- Science club mentor

I used to think I believed in some things. Now I *know* I believe in some things and, more, I am doing something about them. I’ve done some service now and then, a little here and there, a project now and then. This has been so different for me. Every week, and I’ve been doing it all year. I even did my winter schedule so I could stay with my kids. Do you know what I mean? I believe in some things. I really do. I like that. I struggled to. At first, if anything came up, I was ready to say, hey, I can’t go out this week. I really hated that about myself and it caught up with me. My coordinator left a phone message once: “We are counting on you. You knew this was every week when you signed up. We need you.” I replayed that

reduced to a handy numerical chart. As the old adage about “lies, damn lies, and statistics” implies, some numbers are neither objective nor valid. In then—UM Provost Nancy Cantor’s May 2001 words, “Public bodies, including boards and legislatures, ask for performance indicators, and sometimes base funding on things whose principal virtue is that they are easily measured.” As Albert Einstein put it, “Not everything that counts can be counted, and not everything that can be counted counts.”

Let us try to illustrate what we mean with an example. In the summer of 2001, for the second time, we engaged in trying to teach algebra to a small group of 13–14-year-olds who were self-selected by a fear of math failure. Three weeks into the program, we had yet to do anything that could charitably be called “algebra.” We worked on integers, place value, borrowing when subtracting, and other such basic math skills. By the end of the summer, we had been unable to get to as much algebra as planned—but does that mean that we failed? Are these teens worse or better off for the experience? An example of the vital yet non-quantifiable results of this program is a new realization of their need to take charge of their own lives, to think of where they want to go and how to get there, to realize that no one can make their lives a success *for* them.

I’m seeing that I have to think about self-motivation, too. Sometimes in school I just don’t pay attention, or I’m tired, or I’m thinking about something else and I kind of don’t care. Like I’ll know what to do, the assignment, but I don’t do it. Or I do some of it. Or I don’t get it turned in. My [summer algebra] teachers are making me see that this is up to me: like, the teacher isn’t going to check on me or tell me to do it or get it in. I think I have to be self-motivated.

- Summer algebra student

In terms of its effect on their future academic success and their overall lives, all of us are willing to bet that this awareness will have more impact than any math they learned this summer. But would it show up on an achievement test?

We consider ourselves educators; as such, we are compelled to put the needs of children and our UM students first, before any other considerations. We rank their growth in autonomy and purposefulness as much more important—to their lives and to society—than their achievement test scores or their choice of profession.

We cannot serve the needs of society by ignoring or riding roughshod over those of its citizens. Some of our most touching and disconcerting personal testimony has come from

message a few times. Something really sunk in: my gosh, I’m not living up to my word. And somebody needs me. This has been real. Real for me.

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**Why would this busy and successful woman meet every week with my daughter? Well, she just cared—no more and no less.**

- Parent of a career mentee

My daughter came home with the mentor form to sign and right away I thought, what is with this? What do they want? Is this going to be some UM study or research thing? Then, later on, she started coming home and sharing things about what she is really good at and what kinds of jobs might be fun, or she talked on and on about her personality and learning style and how she was just okay with who she was. Then later she came home with this gift she got from her mentor, and I thought, what is up with that? Why did [the mentor] buy her this really personal gift? This is really sad, but it started to hit me that this program was just what it said it was—mentors for kids to help them learn more about themselves and what they could become. I kept thinking there was some hidden agenda or underlying motive for the whole thing. I mean, why would this busy and successful woman meet every week with my daughter? Well, she just cared—no more and no less. This has been a big lesson for me. Some of my daughter’s friends are sort of interested in my work. Now, I’m thinking I should take the time to talk to them about it and even take them to work with me. How are the kids going to know about work if we don’t tell them and show them? I think I thought that she should just find out at school or somehow, I don’t know. I spent plenty of years doing jobs I hated until I met someone who helped me see what else I could do that would be fun. Now what if I had had

university women studying engineering who feel that they were “pipelined” into the field without regard for their personal welfare. Black women have actually used the term “slavery” to describe the process of career “guidance” through which minorities have been pushed into fields where they are underrepresented in order to serve the priorities—however well-intentioned—of others. They feel hurt, bitter, outraged, depersonalized, used, betrayed. How and why did this happen? Well-meaning people lost sight of their true goals in trying to diversify our campuses and work places; they prescribed “opportunities” for young people *without consulting them*. This is why, although we promote career exploration to provide the motivation to do well academically, we insist upon that exploration being child- or teen-centered. Our only legitimate, non-exploitative mission in this realm can be to help young people discover what *they* want to and are suited to become—not to “feed fields that need bodies,” in the evocative phrase of one “pipelined” black woman engineer.

Our notion of accountability is that we owe it to those we work with and for to respect them, their time, their ideas and opinions, and the resources they contribute to our joint efforts. This means that we owe them all a voice in what we do and how, and an accounting of what we have done with their contributions. The reasons that we operate as a learning community in the first place are that we are stronger and more versatile together than separately; that we all have something of value to contribute; and that we are all both givers and takers, teachers and learners. So, to borrow William Spady’s phrase, it is “politically wise, strategically smart,



Owen School Wizards measuring amplitude  
in The Wave Field at UM

people coming and sharing and taking me places when I was a kid? I know my life would have been really different. I think we all think that somebody in school will lead our kids to the careers they should go into. Now think about that. That’s crazy. I guess the whole community needs to see this, we have to pull together and show our kids. This Kiwanis group, that is something, too. I thought: what is their agenda? Why are they doing this mentoring thing? I really didn’t know that groups were around like this. My daughter said they just serve—do community service things. That’s something.

**I was too important to take the time.**

- LS&A woman student

I was bitter, okay? My friend was doing this and she wanted me to do it. Then she climbed on me for not wanting to. I look back and think what a great friend she was, now that I am where I am. We have had so much fun doing *Reach Out!* together. We love our kids and talk about them all the time. What did we talk about before? Right. I guess I was bitter for all kinds of things—about who I was compared to who I told myself I was. Bitter that you guys made me commit to every week and all year. Bitter that she was doing this and that made me look bad and selfish and stuff. When my kids ran to see me every week, jumped on my back for a ride and had so much fun with our projects and stuff, I wore down. I changed. Now I get bitter that I didn’t do something like this before and I had the chance with my church at home and stuff. I just wouldn’t commit. Too busy. I was too important and had way too important things to do to take time to do this. I’m sorry about that, but at least now I know that this is important for *me*. For who I want to be. I listen to some other friends now and

morally sound, and operationally critical” to extensively involve our stakeholders. Those who join us as stakeholders support us because they *are* “us”—they share in our vision and in ownership of our common endeavor. This would not be true if they were treated as peripheral to our activities or as unqualified to voice opinions on them.

Because of this “group administration,” our programs evolve every year. They are refined to reflect things we’ve learned, but also to follow the passions of participants—who also change regularly. Because we do not set “criteria for success” that we know ahead of time we can easily meet, our results are often quite different from what we had originally expected. But, we can comfortably say that *we have never failed*.

Everything we have done has had value, and often that value was something unexpected. For example, we began to recruit UM undergraduate volunteers when it became difficult to obtain enough faculty, staff, and graduate student volunteers. What a serendipitous “failure” that was! Without it, we would never have discovered what a life-changing experience this participation can be for undergraduate students.

If we had not been unable to accomplish as much as we had hoped without requiring a long-term commitment from volunteers, we would never have discovered how important “coming back” is to reaching real effectiveness for both mentor and mentee. Yet, if we had been ruled by a rigid “evaluation plan” established before we began, these groundbreaking successes could have been seen as failures.

What a genuine and catastrophic failure *that* would have been!

just can’t get over that that was me and my friend. My dad says I’m really maturing. Yeah, right. And I mean, yeah, *right*.

**I had it in my head that you had to be one thing. That’s not true.**

Middle school career mentee

Doctor, lawyer, or teacher. Don’t laugh at me, that’s what I thought about when somebody said, “What do you want to be?” Career mentoring and going places really helped me out. Take a doctor: you can go into a million other things that are health-like or medical-like. Something like a PT or nurse, or give MRI’s and CAT scans, or work with hospice or have your own company that sends nurses out to help old people or people at home with really bad injuries. I didn’t think about that last year.

It’s like we have lots of interests, or talents or things we might like to do, and we just might do many different jobs, you know? I had this thing in my head that you had to be one thing. That’s just not true. I liked Jerry and what he said last week about doing different things at different times of your life. I mean I never would have thought that he was a flight instructor, shuttled people in his plane like an air taxi, and then now works at St. Joe’s ER. I think this is neat and it isn’t something I had thought about.

*Camp Discovery  
campers, counselors,  
coordinator, and  
Mike Conboy—  
helper extraordinaire!*

2001



### III. Nuts & Bolts: Replicating Our Organization

We put our values and the recurring “themes” in what we have learned first, because we think that no one could replicate what we have done without grasping and sharing our mindset first. Now it is time to set out some organizational details. This task is complicated by the fact that we want to report *everything* in this final evaluation, and our programs have continually evolved. But that is important to know: there is no one right answer in this outreach work—and there never will be. Just as modern business methods call for continuous improvement, our organizational framework should both allow and encourage innovation and adaptation to changing circumstances and participants.

One thing that sets us apart, we believe, and that underlies our success, is the breadth and quality of the **advising** integrated into our programs. We deliberately cultivate a culture of listening and responding to individuals, which both forms and requires *two-way relationships*. We have taken to calling this the *Kiesa Factor*, after the teen who articulated it so clearly for us. When her older sister spoke of how her volunteer work with a high school group was changing the world for the better, Kiesa asked her, “(1) Can you attach names to that, and (2) how have *they* changed *you*?” In other words, for which specific people have you improved things, and how has doing so changed you? If you can’t answer these questions, then you are holding back, playing the do-gooder. No real or lasting change will happen unless and until you get personally involved enough to be changed yourself. This is as true for the program director as it is for the site coordinators, the volunteers, the support staff, and every single participant in every program.

Conceptually, our programs have aimed at giving children and teens opportunities to do hands-on science, to explore themselves and their career options, and to support them in their academic pursuits. Structurally, **the science** has happened in weekly *science clubs* ([www.eecs.umich.edu/mathscience/scienceclubs/clubs.html](http://www.eecs.umich.edu/mathscience/scienceclubs/clubs.html)) run by a paid coordinator and undergraduate volunteer mentors; in *youth task forces* ([../mathscience/YTF/ytf.html](http://mathscience/YTF/ytf.html)) with a paid coordinator and many one-time community volunteer mentors; and in *wizard programs* ([../mathscience/wizard.html](http://mathscience/wizard.html)) with a paid coordinator who trains young people to do a science demonstration or to facilitate an activity, which is then shared repeatedly with other—often younger—children.

**The personal and career exploration** has taken the form of *career clubs* ([www.eecs.umich.edu/mathscience/exploringsci/careerclubs.html](http://www.eecs.umich.edu/mathscience/exploringsci/careerclubs.html)) run by paid coordinators and bringing in volunteer community presenters, as well as going out for work-place tours; *workshops* ([../mathscience/exploringscicareerclubs.html#workshops](http://mathscience/exploringscicareerclubs.html#workshops)) run by a paid coordinator with several volunteer helpers in a place with on-line computer access; *individual career mentoring* ([../mathscience/exploringsci/MenProcess.html](http://mathscience/exploringsci/MenProcess.html)) through a several-week process by adult community volunteers trained by us, culminating in specifically targeted job shadowing; and *solicitation of career presenters* ([../mathscience/exploringsci/presentation\\_directory.html](http://mathscience/exploringsci/presentation_directory.html)), *tours* ([../mathscience/exploringsci/tourlist.html](http://mathscience/exploringsci/tourlist.html)), and *job shadowing opportunities* ([../mathscience/exploringsci/shadowdirectory.html](http://mathscience/exploringsci/shadowdirectory.html)) available to all and posted on the Web.

**Academic support** has been provided by community and university staff, faculty, and student volunteer *mentors* ([www.eecs.umich.edu/mathscience/reachout/intro.html](http://www.eecs.umich.edu/mathscience/reachout/intro.html)), supervised by a paid coordinator at each site. Because the Ann Arbor schools allow “*community resource credit*,” several mentors have been able to take on the responsibility, with our support, of teaching algebra I and II, geometry, chemistry, and biology to their mentees who were failing in the regular classroom. We have offered two *small-group algebra courses* ([../mathscience/reachout-eval-98/alicia.html#algebra](http://mathscience/reachout-eval-98/alicia.html#algebra)) in the summer taught by paid undergraduate students supervised by our program director (a former education professor). Some programs, of course, cross boundaries. *Camp Discovery* ([../mathscience/discovery/camp2000/2000camp1.html](http://mathscience/discovery/camp2000/2000camp1.html)) is partly

science activities and career exploration, but mostly personal mentoring for children in need of caring adult guidance and wider horizons; it, too has had paid coordination and volunteer counselors and event providers.

The following is a visual representation of our aims and our “product and service lines.”

## A. Chart: Building a Math-Science Learning Community

**Goal:** Establish a “learning community” to support teachers and students in science education and students in personal discovery.

- Objectives:**
1. **Hands-On Science:** Work with teachers to identify and implement demonstrations and hands-on activities to deepen understanding of curricular topics that their children have not seemed to grasp, as measured by achievement testing.
  2. **Academic Mentoring:** Support secondary students in ongoing, one-on-one relationships through their technical coursework, ideally in the classroom with the teacher present after school.
  3. **Students as Teachers:** Assist students in becoming teaching assistants (“wizards”), providing classroom demonstrations or assisting teachers with curriculum-related hands-on activities within classrooms.
  4. **Personal Discovery:** Guide children in technology-assisted self-analysis and career exploration, through career clubs, workshops, or career mentoring. Work with teachers, counselors, youth leaders, and parents to help them use career resources, accessing information, making arrangements for field trips and individual job shadowing experiences.
  5. **Students as Scientists:** Recruit and match interested children with mentors to help them plan, conduct, and share scientific research and experiments. Explore a framework for granting “community resource” credit for such work. Support Youth Task Forces to study and share information, issues, and options with their community. Plan Science Forums at which student investigators can share their research and results.

**Sites:** Schools, church-based community centers, recreation centers, teen clubs, other community centers

<b>Program Elements: Scope and Sequence of Goals</b>		
<b>Elementary School</b>	<b>Middle School</b>	<b>High School</b>
<b>Hands-on science with teachers in classrooms—schools</b>		
<b>After-school science clubs—schools, churches, community centers</b>		
<b>Personal discovery—career clubs, mentors &amp; workshops</b>		
<b>Children as teachers—partnered with teachers and/or clubs</b>		
<b>Students as scientists, including science forums and youth task forces</b>		
<b>Math &amp; science academic mentoring</b>		
<b>Celebration events for clubs and wizards, brown-bag lunches to share</b>		
<b>Symposia for youth, parents, teachers &amp; community on learning, careers, etc.</b>		

## B. Strategies

### 1. *Train the trainers.*

Train-the-trainer and coaching methods, common in the business world, are the approaches we take across all levels. To us, this implies highly individualized training that is both effective and efficient, since we don't make people "learn" things they already know how to do. We honor their ideas, capabilities, and integrity in a system that builds upon one another's assets and experiences, resources and ideas, and personal contacts.

Someone who already has done the task at issue commits to coaching another person. The typical process is (1) the new person comes to watch or job shadow. Together, they share and break down what one needs to know and do, in a very individualized manner that acknowledges the expertise and experience the new person brings to the role. (2) The new person begins to share the role with the experienced person. (3) The new person takes over with the experienced person in the background to mentor as needed. (4) The successor gains confidence and flies solo, coming back to share and reflect. (5) Team meetings ensure we continue to share, grow, and learn from one another and from our mistakes.

Freely sharing expertise develops new leaders—important in a sphere where your best folks are constantly graduating and leaving you! But it also maximizes our reach through decentralization. We could never be as effective if we did all our training in large groups without flexibility. The same kind of individualized teaching/learning process happens in many contexts within our programs:

*Coalition building and stakeholder development.* We work with our UM students and community partners to define a need of our children or teens clearly. Then we look at ourselves: what resources, experiences, and contacts do we possess? We develop our own resources and experiences into strategies and experiences for the youth we serve. Someone may feel comfortable leading the kids in doing a science project but not have the confidence to choose it. Someone else will bring options of projects. Someone else may come along to be able to guide the kids in their learning, to answer questions, or to be a resource to find information that we don't collectively have. For example, Aarti became very capable in managing groups of kids, organizing them into

## C. Voices

### **I turned on myself. I couldn't stand who I was.**

- Engineering student

This will sound nuts to you but I turned on myself last semester. I couldn't stand who I was. And why did this happen? Because of my kids and Amy [his coordinator]. Talk about a reality check. I wanted to be this nice and caring person but, okay, I wasn't. I saw Amy being what I wanted to be. The kind of person I wanted to be. Then my kids. They brought out of me things I didn't know about me. My girlfriend says I got more tender. Okay, that is part of it. And I like it. I've been in control of my life so far, you know? No one caught up with me long enough to make me think about who I really am. *Reach Out!* made me catch up with myself and ask some hard questions. I turned on myself, that's what I say. And I took me down to who I was and stood up to what I want to be. I needed this program. I'm glad I hated to be a quitter, so I stuck with it long enough to look in the mirror. Good thing you make us commit to a semester. I won't tell you how long it took me!

### **It really hit me that I needed something more in my life.**

- Science club mentor

At FestiFall, it was like I was led to the *Reach Out!* table. Sounds weird, I know. But then when I listened to them talking about the program, it really hit me that I needed something more in my life here. And up till then, I don't really think I even thought that I needed something more. I thought I had compassion for others, I said I did. I said I cared about people and kids who weren't as lucky as me. But I wasn't doing anything. This year has been my best so far here [at UM]. And I know it is because I'm involved, I'm doing

small groups or pairs with mentors, and training mentors to do the projects with kids (what questions to ask; don't do it for them; there's no one right way to do it, and so forth). When it came to dissecting cow eyes, she knew she needed help and turned to CUOS scientist Greg Spooner. Greg trained Aarti and mentors, and came out to the sites with them. We ended up with a new stakeholder who had knowledge, experience, and resources we didn't. He took on a role and a responsibility to us and our kids and sites. Similarly, Karyl saw that teens needed to get out in the real world and learn about careers. She and her UM mentors didn't have the information or the work places to take the kids. We reached out to Kiwanians, worked together with them, developed an orientation for and with them, and mentored right along with them the first few times. They ended up being new stakeholders, with the experience, resources, and time needed by the kids that we did not have. They took on a role and responsibility with us and our kids and our sites.

We always start with that defined need of the children or teens we serve and go from there. We pool efforts and share the work load, using each other's gifts and talents and skills. Career mentors make the 6-8 week commitment. Job shadow providers make a once-a-semester commitment. We do the training, orientation, support, Web presence, and evaluation. Together, we give the teens the things they need to explore, learn about themselves, and get out into the real world.

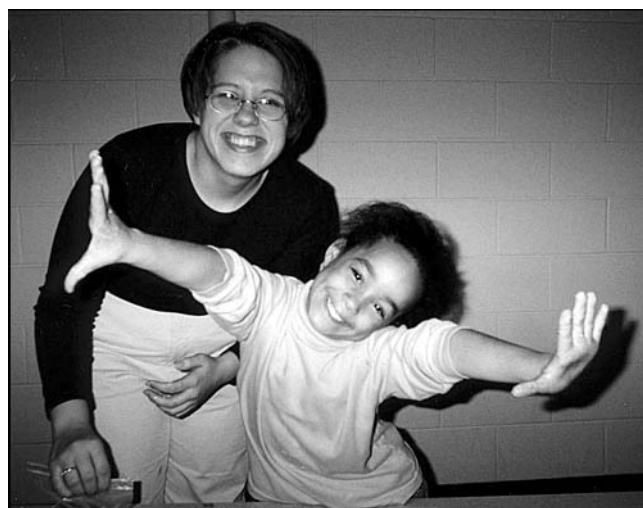
*Science clubs.* We knew children in Ann Arbor needed more experiential science, but how to deliver it? Where? It made sense to reach our target populations at community centers and churches, but we only had relationships at Peace Neighborhood Center. Along came Mike Conboy, who was already at subsidized housing sites doing reading clubs and had established relationships with each site's coordinator, kids, and parents. We agreed the children also needed math and science and so became partners and mutual stakeholders at all the sites. Mike coached and trained Deb and Aarti on the sites: who was who and what was where, etc. Deb became confident and led science clubs; then she coached and trained new UM students to be coordinators at each site. Now, they, in turn, each pick a mentor to train as a successor, before they graduate and leave us.

what I talk about, I am compassionate and now I'm holding myself to it by doing something. I don't know what kept me back before. I'm just glad I stopped at that table that day, signed up, and got that call to get involved. I hate fake people. But I think I was one of them. I'm not now. And I love my kids, I really do. And they love me. Compassion. That's just the word I feel when I'm with them and they're with me. And that is really something. Campus looks different to me now. Everything does, and that probably sounds weird. This has been one really weird year. A great year.

**Kids deserve to have that "why" question answered.**

- Academic mentor

My mentee just asked me, "Why do we have to learn this stuff, anyhow?" That really threw me. Why *do* we? I know you guys are taking kids out to job shadow and I think that is really important. I mean, why do we need to learn so much of what we have to? I think kids deserve to have that "why" question answered. I knew I wanted to come to UM. That was a "why" for me—I had to have the classes and grades to get here. But I think we need more than that, and lots of kids *really* need more. Seriously, when



*Messy-hands science at Bethel AME Church*

*Academic mentoring.* Our program director coordinated this for nearly two years: recruiting and training mentors, finding and registering teens, matching pairs, working with the teachers and principal, being there to support them, evaluating via surveys of teens, mentors, and parents each semester. Then Doris came in as a parent coordinator, paid by the high school. She learned by shadowing the director. Then Karyl (a *Reach Out!* undergraduate) came and watched, took on pieces of the process, and one day insisted on taking over the coordination. At team meetings, she'd share concerns and things we needed to change. She became totally capable of it all—and, frankly, did a better job than we had, anyway.

*Children.* Our Wizard model is coaching of kids to teach other kids. Susan Shoemaker in Pontiac and Sherri Ahearn and Doris Calvert in Ypsilanti have worked with children over an extended period to help them choose a science activity and become comfortable sharing it with a small group or a classroom of others. The form varies (in Pontiac, where Owen School was emphasizing careers, students formally applied and interviewed for the Wizard “jobs”!), but the essence is to empower children and to use them to bring hands-on science opportunities to other children. The trainer coaches, encourages, supports, and procures the materials needed.

*Teens.* Teens work with Deb and UM mentors at Camp Discovery and in several science clubs. They watch the mentoring, start helping out and sharing, and then become mentors with their own kids—first with our support and on-the-spot feedback, but eventually independently. Teens in the Slauson Middle School Builders Club [[www.eecs.umich.edu/mathscience/DAAK/SMSbuilders.html](http://www.eecs.umich.edu/mathscience/DAAK/SMSbuilders.html)] cosponsored by our program director also explicitly do community service. Now that club members have several connections to us (career mentoring and summer algebra, too, for some), they plan to help out with science clubs, too.

*Meetings and presentations.* Again, our students came alongside us to “important” meetings at first (State Senator Alma Wheeler Smith, National Science Foundation staff, College of Engineering deans, Kiwanis leaders, Ann Arbor School administrators, business partners, staff from the Michigan Community Service Commission, UM central administrators). We presented overall scope and goals, and they prepared and gave reports on their particular programs. Now, they arrange for meetings and prepare agenda and make presentations, often without us—or we go only as support and encouragement.

we talked about career stuff in the fall, I really didn't think that applied to me and math mentoring. I've really changed my mind on that. I think we should do a lot more of looking at jobs and careers, and earlier on, so kids have a purpose to take these classes, you know?

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**I thought I was just doing a little community work. Uh, huh. My community out there is working on me!**

- Science club mentor

When I go home to my church, people always stand up and give praise reports and testimonies and things like that. I used to look at these grown-ups getting all excited when they talked and think that would never be me. Well, I've gone back home and stood up sometimes and talked about my kids and what I am learning about myself in *Reach Out!* Go figure! I thought I was just doing a little community work. Uh, huh. My community out there is working on me! Can I tell you how it is to stand up and mean what I am talking about and why I am so happy about it? This experience is changing me and letting me put my faith into action. That may be corny to some but it has been real important to me. My Mom always asks me what I'm really convicted about. Now I talk with her about that. I'm lucky this is happening for me here [at UM] because I don't think too many are doing that, thinking really about what they are convicted about. *Reach Out!* helps me do that.

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**My kids are real. I don't think I was.**

- Science club mentor

I can't get over how selfish we all are. I mean most of us have had just about everything and we just want more. Being in *Reach Out!* has stretched me, big time. What's so important in my life? And why did I get the lucky draw to have so much in my life? And what am I doing to

Examples of this are meetings with UM Associate Vice Presidents, with College of Engineering deans, with the Ann Arbor district science coordinator, and with principals.

*Recruiting at FestiFall and mass meetings.* The program director used to do this, with student input and presence. Then we planned together—scheduling, refreshments, logistics. Then they took over, consulting as needed but mostly just advising us of their plans. They come in afterwards to update us, to share problems and good points, and things we should do differently, but they do all the planning and work now.

*Orientations for UM science club and academic mentors and Kiwanis career mentors.* Again, Jeannine used to do them and the coordinators watched and participated a little. Then, they did them together as buddies, each doing pieces. Gradually, they took over. Now, they just do them solo and come in to share, reflect, and debrief.

*Coalition meetings.* The program director had organized these for years. Staff and students came along to watch and to present their specific programs and services. By January 2000, they planned and ran the meeting solo when the director was on a medical leave. Our next meeting will be hosted by others and presented almost entirely by partners.

*Web work.* Martha Toth trains students or volunteers to help with this. They are coached, work in the same office with constant feedback and review, begin to work elsewhere (from dorm or library, for example) with remote review, and finally work solo, just reporting on what they have finished. Deb created last year's Camp Discovery pages completely on her own, including the time-consuming image editing.

*Flyers, forms, brochures, advertising pieces.* We did them with student input; they did them alongside Martha; now, they create them and bring them in just for editing and approval.

*Database maintenance.* Martha trains site coordinators in the database program so that each can keep up with data entry for his or her program. This tends to require more frequent coaching or retraining, since they forget what they don't use between semesters, but it still works better than Martha trying to enter all data—and inevitably becoming a bottleneck.

*Field trips and family outings.* Jeannine used to get input on when and where to go and do it all. Students came along to help with pieces of the process. They took over more and more until now we sometimes know about these only when they need another helper!

help someone else who just wasn't that lucky? I'm thinking about me a lot now and I'm thinking about my Dad and Grandpa and thinking about who I am going to be. I didn't think about that last year, let me tell you! I think a lot when I go out with my kids. And when I come back. And lots of times all the week in the strangest times. This experience is all over me. I'm going to get engaged next year. This has made me think a lot about that and who I am and want to be and who we, my girlfriend and me, are going to be. I was really selfish, probably still am to some point, but I'm changing that. I guess I think I owe these kids something. I just didn't think about owing anybody anything till this year. I also see what they give me. We think we are giving out there, but I think we are really getting out there. My kids are real. I don't think I was. They are teaching me a lot out there.

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**I know we can make more than a little difference; we can make a really big difference.**

- Pre-med student

My older sister talks about her college experience and protesting things and taking stands for things. I don't think we are standing up for much of anything anymore. I think we could and should stand up that all kids can learn and do learn math and science. I think *Reach Out!* could be a movement like that, and I think we [her generation] could make a big difference. We just came out of the school thing. We know it and we know what doesn't work but we survived. Most of our kids we are working with won't survive. Not the way it is and not with the little help they are getting. I think they know it and I'm knowing it now. I think we could really get behind this and make a big difference. Not just protesting or something, but getting with these kids and helping them learn. It's like we get all bent

*Interviewing business people for shadowing, tours.* Grace Kim (BSEE 1998) went with Jeannine several times to watch her do this. They did it together a couple of times, then together with Grace doing all the talking, before she began to arrange and carry out the interviews, come back and post the Web listing, and send a thank-you with a copy of the posting and tips for shadowing or tour conduction all by herself. The same process worked with learning community coordinators Susan Shoemaker, Marie Cooper, Sherri Ahearn, and Doris Calvert—although, not working at UM, they never took over the complete Web posting process.

*In-class recruiting.* Jeannine did the first presentation/pitch to an auditorium full of Psychology 350 students on doing service learning through us while *Reach Out!* undergraduates watched. They did a piece of the next presentation; then did the whole thing with Jeannine in the audience. Now, they do it on their own, later sharing how it went and what to change.

*Materials for science clubs.* We used to work with them to define what we needed to buy and we did the shopping. Now, they do it all, including the UM purchase order and cash advance paperwork. Jeannine signs and files copies and notes the budget changes on reports.

*Recommendation letters.* Deb had this process “done” to her, watched Jeannine do it, and now sometimes interviews students, writes letters herself, and just sends Jeannine a copy!

*Team meetings.* Ongoing growth in knowledge and perspective is nurtured at weekly team meetings. In addition to things specific to programs and sites, we discuss and explore together such topics as cooperative learning, intentional dialogue skills, personal beliefs and values related to our work, dealing with roadblocks, evaluating hands-on science, developing partners, learning styles and multiple intelligences theories, and our own mission and goals.

The coaching model is used in almost everything we do. It allows us to be efficient, effective, and flexible. It assures continuity of programming as participants turn over. It engenders personal growth and independence, while fostering significant growth in programming, service lines, and sites.

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## **2. Mentor the mentors.**

Whichever people and groups you work with, keep in mind that they will need appreciable coaching and encouragement

about what is going on in the world or what is going on with our generation and we aren't getting behind a cause or something to make it better. Some of my friends are really depressed about the future. They don't want to have their own kids and all. This kind of program could be big. And I know from my own experience, we can make more than a little difference. We can make a really big difference.

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**It's easy to just focus on me here at UM.**

- LS&A student

I had this moral energy or something like that and no place to let it off here [at UM]. *Reach Out!* lets me test my morals and meet people who are serious about morals and their lives, I guess. I mean how many people do you know who are really committed to something outside of themselves? It's easy to just focus on me here [at UM]. I've got this energy, I don't know how else to put it. And I get to use this energy with my kids. And they give me energy. This may sound stupid to you but it is deep for me. I look around and think what we could do if we all got into something like *Reach Out!* It's something. It's energy.



**Coordinator, mentor & mentee at PHS**

for the greatest effectiveness. They will come into the experience with strong but subconscious ideas about learning. These need to be brought to the surface and confronted. We cover a lot of ground in mentor orientations, but many or most of them are hearing ideas for the first time and not yet ready to receive them. You are planting seeds. Later, when they experience some cognitive dissonance “on the job”—things don’t work or people don’t respond as they expected—your words will return to them.

*In-person and electronic conversations.* This is where our site coordinators and program advisor really make things work. As with most mentoring, this coaching is best done one-on-one. In this context, e-mail has been invaluable to us as a supplement to face-to-face discussion. Eight to 20 mentors e-mail the program advisor every week for advice, to share concerns, to vent, to ponder how to deal with adults (typically parents, teachers, coaches, or counselors) in the lives of their mentees. Sometimes, they ask for academic advice: how can I teach my child fractions, increase vocabulary development, or foster conceptual development? The advisor can suggest alternate approaches to try, including applied problems or some version of manipulatives that can make mathematical operations easier to grasp.

Mentors often ask for help understanding their child or teen’s development: is this normal? What can I do to help him/her to be more self-directed and responsible, or to deal with peer pressure and parent/teacher pressure? Many with older children and teens are very worried about addictions and harmful habits and choices kids are making—drinking at weekend parties, drugs, eating disorders, sex. The advisor must also deal with mentors about their own and their mentees’ choices about relationships, activities, choosing friends you look up to and who make you want to become more than you are.

This may sound intimidating, but often all it requires is solid listening. They need a sounding board who won’t judge them. Obviously, the program advisor needs to have the time, the heart, and the education/experience required to deal with such issues and concerns. *We absolutely recommend against having a director who is a faculty member!* He or she will not have the time to do the job right—and the program succeeds or fails depending on the quality of its leadership. The maturational benefits for undergraduate mentors, in particular, hinge upon excellent and abundant advising. This

**I don’t think I know anybody that really likes their work. I don’t want to live my life like that.**

- Middle school career mentee

What makes you happy? Right. That day really got to me. I don’t know, I just haven’t thought about what makes me really happy. But then when I had to think about that, it kind of scared me that I just didn’t, like, know. Then we talked about who we know that loves their work. That was something, I don’t think I know anybody that really likes their work. That really made me start to thinking that I don’t want to live my life like that but what am I going to do so that isn’t me? My mentor was so good at making me think about me, what I like to do, what I can do, what jobs are out there, and what I need to do if I want to have a good job I like and things like that. This isn’t stuff we usually think about, but I think we should be. Then we went job shadowing and the lady was so nice to us. She talked about stuff she did that she wishes now that she wouldn’t have. I think that is something that she would share stuff like that. It made me think that I’ve got choices, even right now, that I wasn’t really thinking about before. I’d never thought about stuff that I’m just good at—stuff I didn’t have to learn, you know? But I have things that I really like to do that I think would be fun to do for a job. And I learned about my personality. That was really cool.

**We all mean well, but we all only know what we know.**

- Kiwanis career mentor

You stop to think about it and young people really don’t know much about work and careers. I mean, we usually know about fields because of our parents or family members or maybe a friend. I think about the dental school. Many of those students were following in their parents’ footsteps or somebody

is important enough that it should be a legitimate part of someone's job, not just an add-on when or if time is available. In this context, we are proud to note that *Reach Out!* advisor Jeannine LaSavage was chosen Advisor of the Year for UM student organizations in March 2001.

As they deal with and love their kids, mentors come to recognize the same issues in their own lives. We realize together that we can encourage one another, sometimes support one another, but rarely if ever "change" anyone else. It helps them enormously to use the same analysis on their own lives as on their kids' lives: recognizing what the problem is, figuring out what *they* can and cannot do about it, and deciding what to do. We often laugh about this little process: "Name It. Claim It. Deal with or Change It." This is a recipe for becoming an active problem-solver in your own life, rather than just drifting and making poor choices without much thought.

Just as mentors come to better understand math or science by trying to impart concepts to their mentees, they learn about directing their lives while trying to teach their children and teens to do so. Helping a young person with learning problems also makes them really think about their own learning process, often for the first time.

One advantage of continuing programs is the mix of new and old volunteers. The experienced hands can mentor the new mentors. The volunteers learn from the modeling of behavior by their site coordinators (who have previously been volunteers themselves). The printed handbook we prepare for volunteers is an auxiliary memory and a source of advice when they hit a rocky place and can't get to an advisor right away, but there is no substitute for a conversation, in person or electronic, about exactly what they are experiencing and might do about it.

**Recommendation letters.** A powerful mechanism for encouraging the interaction that allows for this kind of personal growth is the college student's frequent need for a recommendation letter. Our advisor typically writes 80 letters a year. Our UM students let her or their coordinator know one is needed and we begin the process: first an e-mail exchange establishes what they need and when; then the advisor visits them on-site to see what they do and how. Next, they come in for a good hour's chat in the advisor's office. They speak about themselves—what they love, their goals and hopes, their convictions, what they learned about

they knew well. You think that high schools have counselors there to really delve into career planning, but that really isn't true. There is so much else they are doing and, really, what would they know about careers and how they are changing anyhow? This is important. And you want young people to eventually be happy with their jobs. That just can't happen if they don't get a grasp of what they are about and good at, and what they can study and go into that will be rewarding. I think parents, teachers and counselors oftentimes mean well, but they steer students into career paths that really aren't going to be a fit for them. I think now about how little we all know and how we need mentoring and things like this to get a broader group of people available for these young people with a much broader range of careers to see. We all mean well, but we all only know what we know. We have to come together to share with them our collective knowledge, experiences, careers and workplaces. There is so much now that they can go into. You don't want them to go down one narrow path only to come out and see that they don't enjoy that line of work. Then what? Do they take more time out to go back to college or for training? Do they borrow more money and have more



*Career Fair attendees at Neutral Zone*

themselves being with us and with their kids or teens. Because there is already a relationship, many share pretty deep things—what has been growing in their hearts and minds to bring them to really commit to teaching, medical school, or law school. As you can imagine, this process allows for very personal and meaningful recommendations.

Very often, though, our UM students come in to share that they are lost about what to major in, or what jobs to seek. We often use the personal discovery materials we gathered and developed for teens to help them look at their personalities, gifts and talents, skills, broad career categories, and so forth. Many feel bad and sad about not wanting to pursue what someone else (parents, counselors, teachers) has in mind for them. They don't know how to talk to these important others, don't know what else they ought to be studying instead or even how to think about that. There is such a great need for real, personal counseling about major life choices, and few places to find it. Many feel such guilt and shame about the family resources that have been devoted to their education that they just do what others expect of them, deciding not to really dig in and explore their options. Others, just like the kids they mentor, start to see that their lives are *their* lives.

This letter-writing process is very special—an opportunity for them to convey in some depth who they are, what they care about and can do, and why they would be super for whatever they are trying to do. We have incredible young people here! Usually, they have gained great knowledge about themselves from their *Reach Out!* experiences. It is a pleasure to take the time to help them on to the next stage of their lives.

**Keep an open door.** Advisors need an open-door policy. Most parents have learned that the quality vs. quantity time dichotomy is a false one: without lots of time, the “quality” communications just don't come up. Our outreach programs and people need similarly broad opportunities for communication. When coordinators or mentors are in the building to meet or to pick up materials, they frequently stop in. That is when we really talk, share news and concerns, and deepen our relationships—which can't be done as well on a schedule. Many also make “appointments” with the advisor, but the best sharing, encouraging, supporting, and learning comes when they drop in.

That is when you can ask questions to help them ponder their life options and obstacles. You can offer them an adult

student loans? And what will they go into, anyhow, that would make them happier than what they are in now? You see this so often. They get out of college, say, and into a career that they just don't like. But then what? I think they often get painted into a corner. We have to start much earlier and with many people to show them what they can be and go into.

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**How can our young people reach for a goal that they know nothing or very little about?**

- Kiwanis career mentor

We all get so busy. Moms and dads are busy. Grandparents are busy and many don't see their grandchildren very often and when they do, they aren't thinking about talking about careers or life plans. We all are so busy, going here and being there. Career mentoring is something we really need to stop and think about and do. How can our young people reach for a goal that they know nothing or very little about? How can they learn about work and jobs and careers if we (community and families) don't take the time to show them? I was pretty surprised that my student liked what we did so much. I mean I'm an older person and I thought that he wouldn't think I was very up on things or want to listen to me. That wasn't the case.

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**I have to learn, and if it isn't happening, I have to do something.**

- Middle school career mentee

It's so weird to think about how we all are so different from each other. I really liked looking at temperaments and learning styles. I mean, I've never really learned about things like this before and it all was so fun and interesting. I also got to thinking how I have to do my own learning. I mean I can't sit back and think it will just happen to me. That day we talked about that got to me.

perspective on hard times: that's when we are pruned so we can grow more; this is not the end of the world or your life; you can learn from this rejection or bad choice or less-than-ideal choice; there are always options. The advisor must truly *care* about them, must *support* them in their plans and ideas, must *be open* to projects that seem overly ambitious or not quite on the mark. The advisor does not so much direct as guide and support from the side, metaphorically running along beside them—getting the resources they need but can't get themselves (people, stuff, transportation, food). The advisor's job is not just to run programs but to develop young adults: let them grow, evolve, and develop into themselves—not what *you* think they should be or do, or what the program “needs.” Let them make mistakes and then see that we all learned from them. Be available! Sometimes you have to literally drop what you are doing or where you were going to be there for them. They are our top priority.

***Meet them where they hang out.*** The advisor often meets mentors downtown or on central campus, for coffee, ice cream, etc. For them to come to North Campus is often hard (many have never been here, in fact, before joining *Reach Out!*). It is also a way to show respect for them, their time, and “their” campus by coming to see them. We've done lots of planning meetings over breakfast, coffee, a smoothie. Often, our older partners come, too—such as Kiwanis friends, as we plan for career mentoring, shadowing experiences, and career fairs. We must note how rich an intergenerational environment can be for all concerned. Whether children, teens, young adults, the middle-aged, or the elderly, we have all learned from each other—including the writers of this report.

***A couple of final notes.*** We have learned that young people—whether they are our elementary-aged “wizards” or our university students, should be explicitly prompted to think about their status as role models for those younger than they and as representatives of the university and of *Reach Out!* They will typically rise to the occasion, but sometimes this does not occur to them independently! Finally, when they invite you to meet family and friends, make every attempt to do that!

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### ***3. Build in time for reflection, preferably in groups***

Our coordinators need to spend regular time together with their advisor, communicating exactly what they are experiencing and what they require in terms of support. They need to

I was kind of thinking that a teacher or something has to teach me, you know? But, I mean, I have to learn and if it isn't happening, I mean, I have to do something. I don't think I'd ever thought about that before. I really think I want to work with computers, but I can't go to college for that if I don't do okay in other classes, you know? I can't just forget about English and stuff or forget about my grades in them. I liked seeing how [other students] all like different things and finding out about careers we might really like. I liked the poet—she was way cool. I like to write but I hadn't really thought about that much. She talked about writing for a newspaper or magazine, too, or writing your own book, or working with somebody else on a book together, or being an editor, or writing manuals for computer software. I really have learned a lot from this. Thank you for doing it.

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#### **I never thought about having to know all the pounds of weight on a plane.**

Summer algebra student

The airport was cool. I didn't know you could get a license to drive a small plane like you get a license to drive a car. And that thing about renting a pilot and plane to go someplace—that's cool. I never thought about having to know all the pounds of weight on a plane.



***Coordinator & mentees  
at the Neutral Zone***

be periodically refocused on their goals, helped to brainstorm solutions to problems, and able to enjoy the fellowship and camaraderie of others in the same position. If this time is not actually scheduled, it tends never to be found. We get so caught up in being busy that we never sit back and look at our work from an objective perspective. We also, then, fail to appreciate just what we are accomplishing—and this sense of purpose is vital to keeping us going!

We have all found our Team Meetings very worthwhile; to those out in the field by themselves, they have been simply invaluable. In fact, whenever someone has been unable to return regularly to “home base” for this purpose, that program never reached effectiveness or has gradually fallen apart. For example, we have attempted to establish school-based learning communities with a community woman as coordinator in three places: Pontiac, Detroit, and Ypsilanti. The greatest and longest-lasting success was achieved in Pontiac, where the coordinator has a terrific record of driving almost weekly to Ann Arbor (truly an ordeal!) for meetings, even when there did not seem to be a crying need for it. Susan Shoemaker has repeatedly remarked over the years that, much as she dreads the driving, touching base like that grounds her, recharges her, “pulls her back in” when she has gotten overextended, and helps her to guide the evolution of programs to meet changed circumstances.

A similar attempt was made at a Detroit middle school, but it was abandoned after a year. There were a number of problems with this site that contributed to our decision to move on, but a big one was distance. Ms. Shoemaker in Pontiac has made an exception to the rule—that learning communities must be local—by sheer determination and talent. Our Detroit coordinator was simply unable to spend enough time with us, nor we on site with her, to make it work there.

When we moved to an Ypsilanti elementary school, things went quite well for a couple of years, but after coordinator Sherri Ahearn changed jobs and was no longer free to come to Ann Arbor regularly, we lost the “center” that held things together there. Other program variations, such as a year of in-classroom science clubs run by UM student volunteers and a

That was really interesting, thinking about when I fly that they weigh my suitcase and put it in the computer. I really liked seeing the small planes and inside one of them, too. Isn't that funny that they figure out fuel in a plane by pounds and not gallons? That was a fun day. I liked it.

**They need someone, an adult, to focus just on them.**

- Middle school teacher

Attention. I think that word sums it up in many ways. I need the attention and my kids need the attention. It feels good to have [the career mentors] come in to my classroom and pick my kids up. Some days when I have been down, their smiles have lifted me up, for the whole day. Some days when I have felt all alone trying to teach these kids, they make me see I'm not all alone. We get a team thing going and I'm telling you that it feels good. I know my students love this. They need someone, an adult, to focus just on them. To feel special. To be heard. To be asked questions to think about who they are, what they are good at. And the job shadowing is so important. What jobs are there out there? Who are people to share with them what they can



*Burt presenting aviation careers – Career Fair at the Neutral Zone*

garden club and a science wizards program run by UM Outreach liaison Doris Calvert, had their own successes, but they were no longer involving the local community in the purposeful way that Ms. Ahern had been able to do.

So, our recommendation would be to keep programs close enough to home to allow for frequent and regular meetings. A true learning community is best formed within a genuine community; people have a personal stake in their own neighborhoods and cities that they do not have elsewhere. When we all share community space, we encounter each other around town—as our coordinators and volunteers do, constantly running into “their kids” at the grocery store, the movie theater, or the mall. The children love the opportunity to introduce their mentors to their parents, siblings, or friends! This proximity also allows us to serve the same children in many ways (science club, summer camp, summer algebra, career mentoring, academic mentoring) that can follow them as they grow, rebuilding community support around them.

An alternative to staying in your own backyard could be to develop an “ambassador” program, as our *Reach Out!* student group would dearly love to do, to send coaches out into the field to guide others for an extended period through the process of establishing programs like ours. (Several recent UM and *Reach Out!* graduates are seriously interested in serving a Peace Corps–like stint as ambassadors, if we can secure funding for such a program expansion.)

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#### ***4. Take advantage of the availability of young adult volunteers.***

We have had some difficulty convincing people at UM that our kind of outreach has anything whatever to do with the “core mission” of the university. Years ago, we might even have agreed, but no longer. The testimony from our young adults about the impact of the work on their own development is both startling and gratifying. How *could* we have thought we were educating them before? In Appendix B to this report, please find the chart of our goals for them. In the *Voices* running down the right sides of these pages, note how transforming their experiences were for them. Even if nothing of consequence were happening for the children and teens with whom they work, it would still be worthwhile for the maturation this service stimulates in the volunteers. We

become? I can't deal with that and I don't know who to get with to do that on my own. And, I have to teach, that's my job. But I know that this part is so important for the kids. This experience has made a huge difference in many of our students' lives. It didn't take a lot out of any of us, I mean, really when you think of it. But look at the rewards, look at the difference it has made in some of these kids' lives. We've had kids that just didn't care about school turn around. I've had girls who were aloof and suffering so little self-confidence really change. Attention. Caring. Being there to smile and listen and encourage you. Our career mentors do that for the kids and all of us.

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#### **You're trying to show us how math gets used. I really like that.**

Summer algebra student

I really liked the Chrysler trip. I liked the van ride on the roads and the test track and oval. I liked the crash impact lab and the dummies. I liked the wind tunnel. This would be a way cool place to work. And when you're in college in the summers, you can be a driver. You have to have no tickets and they do drug testing. You guys are trying to show us how math gets used and jobs we might like to think about. I really like that part of this summer.

#### **I really didn't know what college you needed to be a vet, but I do now.**

- Middle school career mentee

I thought I wanted to be a veterinarian. Well, [my mentor and I] visited a vet. She was so nice and took so much time with us. She showed us all around and let us be with her when she examined a puppy. She talked about all the school and college you need to be a vet and how everybody told her she couldn't be one. She didn't do well at college and she got rejected from lots of vet schools, but she didn't

believe the change in them will make a lifelong difference in their lives and for their future families and communities.

But what if you don't have a university right down the street? We have had some success with car- or van-pooling volunteers to other communities but don't recommend it in general. It calls for a much larger time commitment from volunteers—and college students haven't a lot of time to spare. Instead, why not involve other groups within your own community? We'd suggest church groups, police cadet programs, scouting groups, teen clubs, National Honor Society groups, and so forth. They need not be college-age: high school teens help out in some of our science clubs, and middle and upper elementary students mentor primary-age students. They all gain a great deal from the experience.

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### **5. Pay your coordinators—they're not a frill!**

We learned early that a large-scale volunteer program needs to pay coordinators. Organizing volunteers, planning and preparing activities, keeping good records, and handling road-blocks and problems in the field requires a lot of time and dedication—too much to ask of volunteers, especially college undergraduates. They have a lot to do and to be distracted by, and need help accepting the need for responsibility and reliability in a coordinator. Paying them—even though their work-study or other stipends are not much more than minimum wage, and the hours for which they are paid are much fewer than those they actually work—makes all the difference. When it is their *job*, they know that people are counting on them and the work has to get done. Sometimes they will delegate to trusted volunteers when school commitments interfere, but they take the responsibility to see that things get done as needed.

*Enthusiastic camper launching a compressed-air-powered rocket!*



give up. She loves what she does. She said I could be a vet tech, too, to see if I liked it, and still decide to become a vet later on. I could get training just by working at a vet's office to be a vet tech, or I can go to a college for a couple of years. Or I can work hard and go to college four years and try to get into a vet school. It's real hard, though. I really didn't know what college you needed to be a vet but I do now. I think that maybe I'll be a vet tech first. I really like this program. It's helped me a lot. [The vet] told me I could work part-time there, too, and that would help me know if I really wanted to work with animals.

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### **They are making me see that this is up to me.**

Summer algebra student

I think I got things, well, I'd say, "broadly" in math. This summer I'm looking at what I'd say are the details. Like I get something overall but I don't know the skills or like how to use them in a different way. I'm seeing that I have to think about self-motivation, too. Sometimes in school I just don't pay attention, or I'm tired, or I'm thinking about something else and I kind of don't care. Like I'll know what to do, the assignment, but I don't do it. Or I do some of it. Or I don't get it turned in. My [summer] teachers are making me see that this is up to me, like, the teacher isn't going to check on me or tell me to do it or get it in. I think I have to be self-motivated.

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### **I need some friends that are okay about people thinking they are smart.**

Summer algebra student

This summer is making me think about my friends. I mean, a lot of my friends, well, they don't really like school. When I'm with them, I don't have to think about school or homework and things like that. [Our instructors] have been saying

Similarly, our mothers and other community coordinators have been paid modestly to coordinate science clubs, career clubs, and other programs, to great effect compared to the amount of money invested. Being paid shows respect for their time, as well as reinforcing their responsibility for programming. Their being paid allows us to require their attendance at team meetings. And, as Ms. Shoemaker has pointed out, even a modest pay rate can make an enormous difference to an urban mother trying to justify working where her heart is instead of where the money is.

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**6. *Avoid dollars with strings attached.***

We are grateful not to have a substantial infrastructure or overhead to support, because we have been able to avoid compromising in an unhealthy way in the pursuit of funding. There are considerable grant funds out there for the taking, and it can be overwhelmingly tempting to take on partners or to modify programs to fit a Request for Proposals. We have gone so far ourselves as to invest considerable time and effort in such attempts, but pulled out before submission when we realized we were getting into something we did not want to follow through on. Anyone who lives and dies by grant funding can tell you stories about the kinds of partnerships-in-name-only and “deals with the devil” that can result. Be very clear about your values and beliefs, your goals and non-negotiables. Being adaptable, open to new ideas, and truly collaborative does not mean you must abandon your aims or force-fit them into programs where they do not belong. It is *people* who make things happen, and they need not cost as much as you might think. Find people who are also passionate about what you want to do and trust the money to follow.

As an example, consider our career mentoring program in conjunction with the Downtown Ann Arbor Kiwanis Club. Driven by the convictions of some of our UM *Reach Out!* students, we had been trying to extend academic mentoring to encompass self-discovery and career exploration. There simply was not enough time! The high school mentees needed so much academic and study-skills help that mentors rarely managed to get to the rest. Our high school mentoring coordinator, Karyl Shand, developed and piloted group self-discovery workshops in an attempt to find the time. They work well enough for the self-discovery portion, in which teens learn about personality types, learning styles, multiple intelligences theory, and the like. But we believe that actual

how we have to take care of ourselves, you know, like how well we do in school [determines] what we can do when we get out of high school. I think I know that, but I need to think more about it. I know that you can't get into good colleges if you don't have good grades. I think I need some friends that are doing school, that are okay about people thinking they are smart or being like a teacher's pet. Like they say, high school really is going to count. I'm thinking about that.

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**We have something very important to share—ourselves.**

- Kiwanis career mentor

Career mentoring is very important for all of us. I started out thinking that I didn't really have much to share. But now, I see that I can share my life, where I have been and where I am. I can share how to start your own company, how to have goals and not give up on them, how to reach out and gain from other people in your life. How to not give up on yourself. How to think about what you are really good at and then to look at jobs you could have that will apply, that so you can be happy about your work. I can share things about my life, how I went to college but ended up having my own company. I really believe that helping them look at their personalities and learning styles is also



**Mentor & mentee at Pioneer High**

career exploration should be specific and individual. Instead of choosing from what is offered at a career fair or in a school-to-work program, job shadowing and tours should be tailored, after the hard work of self-analysis, to exactly what an individual wants to pursue.

So, we developed a several-week career mentoring process that matches an adult mentor with one or two teens. Our mentor volunteers came from the Kiwanis Club and, consequently, have worked through their affiliated teen organizations—high school Key Club and middle school Builders Club. Each spring and fall, a group of about six mentors has met with 6-12 teens at their schools. The school computer labs allow the whole group to go through on-line diagnostic instruments, and discussion of the results actually seems better with the larger group. Once the teens fix on an area for further investigation, though, the mentors find people and places to visit and arrange for these trips. Often, several teens will tag along to learn more, but each gets at least one visit tailored specifically for him or her.

The cast of mentors rotates with the personal commitments of each, but about a dozen of them do this at least once a year, and a few new participants try it each season. It has become accepted within the club now that community service, in addition to the prodigious fund-raising and grant-making of this club, can encompass this more personal service to youth.

The club has also, however, committed continuing modest funding to support this and other programs run by the *Reach Out!* folk they have come to know and trust. Once they came to share our passion, they provided both the volunteer hands that make the work inexpensive and the funds it requires for materials and some paid planning and coordination time.

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### **7. Give youth opportunities to do science and math.**

There is no one or best way to accomplish this. We have tried multiple strategies over the years; none has been a complete success or a failure. The forms changed as the cast of collaborating partners did, showing that there is always *some* way to make a difference.

Six or seven years ago, we would have said that our intent was to help teachers learn to infuse experiential learning into their science and math lesson plans. While many elementary schools have incorporated routine use of manipulatives into math teaching and learning, doing science was a little harder

important. I've learned a lot about learning, too, from this. We all learn in different ways, and that is okay. But we need to know about ourselves so we can choose classes and goals that are realistic and will lead to success, not failure. I really enjoy this and I hope we get more of us (Kiwanis members) involved. We have something very important to share—ourselves.

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### **They are making me see that this is up to me.**

Summer algebra student

I think I got things, well, I'd say, "broadly" in math. This summer I'm looking at what I'd say are the details. Like I get something overall but I don't know the skills or like how to use them in a different way. I'm seeing that I have to think about self-motivation, too. Sometimes in school I just don't pay attention, or I'm tired, or I'm thinking about something else and I kind of don't care. Like I'll know what to do, the assignment, but I don't do it. Or I do some of it. Or I don't get it turned in. My [summer] teachers are making me see that this is up to me, like, the teacher isn't going to check on me or tell me to do it or get it in. I think I have to be self-motivated.

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### **I don't think there really are geeks. I think they are just the kids that are taking school seriously.**

Summer algebra student

There's a big game going on in classes at school. Like some popular kids act like they don't care. Maybe some don't, but some do, and they sort of secretly get the work done and secretly do good, but you don't know. Some are going to act bad and all, like they don't care, and some of them really don't. Some won't raise their hand to give an answer 'cause it isn't cool, or sometimes they don't know the answers but wish that they did. Some people will look down on those who are

and messier. Teachers lacked materials (both consumable and reusable), time, confidence, and the extra hands needed to supervise a lot of hands-on learning experiences. Our plan was to provide materials and lesson plans, plus a community coordinator inside schools to organize and demonstrate them and to recruit community members to help out. After a few years, we hoped to be able to switch to new sites as the original ones no longer needed us.

Things did work fairly well as long as we had a mother inside the elementary schools in Pontiac and Ypsilanti. The schools provided classroom space and paid for about half of the coordinators' time, showing the value they placed on what was happening. But we cannot say we ever successfully reached the "hand-off" point: when the coordinators left, the programs atrophied quickly. This fact illustrates a genuine problem in trying to make systemic changes within schools: everyone is so over-scheduled already that they simply cannot add another thing to their plates. We did leave behind caches of materials and lesson plans, and cadres of teachers who are much quicker to turn to hands-on learning experiences, but, if this is a revolution, it is a small and quiet one—not the dramatic change we had hoped for. Even if school folk appreciate the value of what we brought, that does not mean they have the finances to spare to support it themselves. The programs died without paid *people* in the schools to coordinate them.

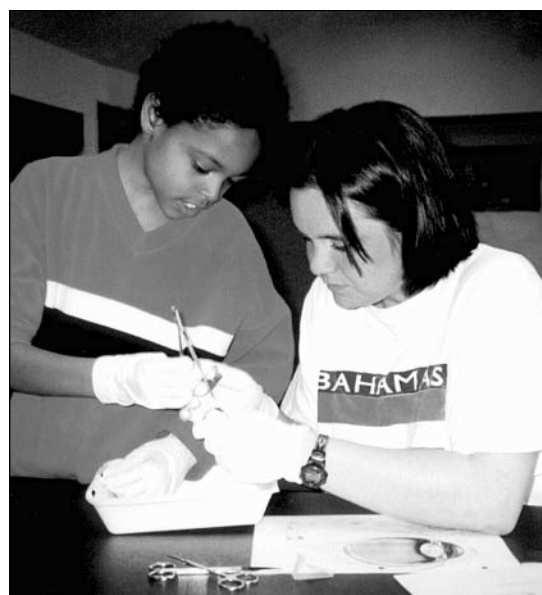
After we lost the two mothers, one to another job and one because the school no longer contributed to her pay, we tried other strategies. In Ypsilanti's George School, we collaborated with UM's Office of Academic Multicultural Initiatives to run four weekly, in-classroom science clubs for two semesters in 1998–99. The children learned from and greatly enjoyed them, and that was when we first became aware of the strong impact this volunteer work was having on the UM undergraduate students. Some students, in addition to financial support for the coordinator and for materials, came from OAMI, but most students were recruited from UM at large and from one fraternity, *Pi Kappa Alpha*. The fraternity brothers were particularly enthusiastic about how much they loved this work, recruiting others by word of mouth. There is just no substitute for having many hands to supervise science projects! Participants informally trained newcomers as the coordinator, recent UM graduate Aarti Raheja, had trained *them*—to let the kids do the work, to ask the right

doing good and call them geeks. I don't think there really are geeks. I think they are just the kids that are taking school seriously and have it as their goal to do well, you know? But popular people and bad people, they all call them geeks. I feel for teachers sometimes because of all the games going on.... Some are really mean or grouchy or don't like kids. I think it's because of all the games going on.

**Adults will say, "Just ask for help," like it is there for you when it really isn't.**

Summer algebra student

These teachers know about us and our lives. They are closer to our age. I mean, they understand what we are dealing with, and I think they know more about what we are learning or how we learn. They relate to us. They set us straight, too, like: you better take control of your life, no one else is going to. Or they'll say you know you can learn all of this, so it's up to you to try and get it, or not. They really believe we all can learn *all* of this, not just some of it, or this person is good at that and others aren't. If we don't



*Eye dissection at  
Bryant Community Center*

kinds of questions, to *wait* for answers, to suggest modifications to procedures and urge them to speculate about what might happen.

What a lesson this was for us! We had resisted bringing volunteers to the schools, convinced that they would take over ownership of the program, so that it would die when the volunteers left. Well, we were mostly right about that, but that was only half the story. The kind of science we do with children will probably never be possible for a teacher with a full class: it requires way too much supervision and one-on-one interaction. It is extremely valuable for youngsters, though, and for the volunteers, as well. Now, we believe that we should offer such programs whenever we can, and there is no reason to lock them into school sites. We have been very effective at community centers run by predominantly black churches and at subsidized housing sites. The latter have the additional advantage that children are there as volunteers, themselves, which minimizes attitude problems that can impair or obstruct learning.

**Applied math.** Although “Math-Science” has long been part of our name and mission, there is no question that we’ve focused more on science. We do believe, though, that math is just as—if not more—important to keeping doors open for young people. Back in 1995, when we were forming this new coalition at UM, CUOS Director Gérard Mourou insisted that algebra is the key—the gatekeeper course that determines whether a teen will be able to pursue a technical career or not.

That is why most of our academic tutor/mentoring has been assistance in math studies. Obviously, students often have difficulty with math, parents frequently feel inadequate to help them, and teachers have overwhelming student loads, so such services are a natural solution where a technically literate corps of volunteers is available. The major difficulty is one of *reach*—we will never be able to supply enough mentors for everyone who needs or wants one, which inevitably raises questions of equity. Those of us from other communities, or without teenage children, have been surprised to learn of the almost-universal resort to paid tutors among middle-to-upper-class high school math students in Ann Arbor. Imagine how much further behind this puts the disadvantaged! Universal math mentoring might actually work but is hardly a practical solution, especially for communities without a university full of potential mentors nearby.

get something, they know it and they stop, back up or whatever it takes to make sure we get the time and chance to really know it before we just go on. In school, I feel like we are just going on all the time whether we get it or not. I mean, where do you go if you know you didn’t get what was covered? You can try to ask your parents, but lots of times they don’t know it either, or they are busy. Friends sometimes might help you but not too often. Really, sometimes you don’t understand that adults will say, “Just ask for help,” like it is there for you when it really isn’t. Or a teacher might meet with you a couple of times, but they aren’t going to take too much time and you might not know what you aren’t getting, or they think you need this or that and you don’t speak up to say, “No, I get this but I don’t get that.” I don’t know, it just doesn’t work out to get help very much. Then sometimes, it’s like you don’t want the teacher and everybody to know you need help.

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**I like knowing what I really know.**

Summer algebra student

I didn’t get the overall thing of math. I like looking at what we are learning, and what we have covered, and what we just might not get to. I couldn’t have told you things about math before, like I can tell you [now] I’m working on decimals, fractions, percentages, and absolute values. I would’ve said, “I’m just working on math” and wouldn’t have known *what* I’m working on. I like knowing what I really know, too. Am I making sense to you? Like, do you know what you *know* about math?

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**I like it that I can stop and really learn something before going on.**

Summer algebra student

This program has really helped me, even more than I thought it could. I

An alternate solution, we think, is to look outside of schools. Plenty of groups are working on various kinds of education reform, and that is certainly needed. As Carlos Rodríguez noted in a June 2001 presentation at a National Science Foundation conference on The Cultural Context of Educational Evaluation, “We know we have a cadre of influential and entrenched mathematics and science teachers who do not believe the ability to learn mathematics and science is ubiquitous, but is really reserved for a select few.” These kinds of expectations can, of course, be self-fulfilling. Our work has absolutely convinced us that actual content knowledge—or the lack of it—is rarely as important as a learner’s motivation to learn and estimation of his or her ability to do so. These affective aspects *can* be dealt with outside of school. That is one reason to do hands-on science, to experience success and competence at “doing science.” In a similar fashion, youth can be given opportunities to “do math” in real-world contexts that reinforce both meaning and capability.

The lesson I draw from [history and statistics] is that the idea of citizenship now requires not only literacy in reading and writing but literacy in math and science. And the way we guarantee this necessary literacy is through education conceived of much more broadly than what goes on in the classroom.

- Robert P. Moses, *Radical Equations*

Such opportunities to learn outside the classroom were a hallmark of our summer 2001 algebra program. Three young adults guided seven young teens through weeks of personalized teaching and learning, supplemented by a series of field



*Ayiesha, Debra & Kiesha – summer algebra*

like the small group and being able to get one-on-one help just about anytime any of us need it. And if we don’t understand something, you don’t feel dumb or stupid. It’s like they just help you slow down, go back, and do it again until you can really get it. I like it that I can stop and really learn something before going on to something else.

I think the field trips have been okay. I can see how different people and jobs use math. I really liked Kathy and learning about interior design. She really loves her work and said that’s important, to really like what you do.

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**I feel like I’m running on a track and don’t know how far I have to go or what my time is.**

Summer algebra student

I wanted to do this program because I know that I need help. Math is hard for me. I try really hard but I feel like I never really get the things going on, in the book or class. And then we go on to something different. It’s like I feel when I’m running on a track and I don’t know how far I have to go to finish the race or what my time is. I know I have to take all these math classes and that scares me a little. I guess I just hope I can figure out more about math so I can do better in school. Sometimes I look around and wonder if anybody else is thinking like me. I think they are but none of us say so.

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**Before I came in here I didn’t know how far behind I was!**

- Summer algebra student

We just have to do something different in school. It just isn’t working, and it’s not just a few kids that aren’t doing all right. I can’t believe how you guys did this for us, and for free. Everyone here really cares about us. It’s kind of sad, but you don’t feel like that too much in school. Maybe it’s too big or something, I don’t know, but I can feel

trips designed to show how math is used in a variety of real-world settings. They tried doing the kinds of preflight calculations that are done by pilots, involving air and ground speed, fuel consumption, and fuel and craft weight. They did unit price comparisons at a grocery store. They measured their own bedrooms, designed a redecoration scheme, and went to a home improvement store to calculate how much of what they'd have to buy and what it would cost. They visited an interior decorator and learned even more about the importance of math to estimates allowing a decorator or a builder to cost out a proposed job. They visited the DaimlerChrysler Proving Grounds to learn about crash-testing calculations and the mathematical models that allow precise duplication of different kinds of test surfaces and tracks, in addition to experiencing some interesting speed and *g*-force effects on the various test tracks! They investigated the physics of weight machines and the interaction of speed, distance, and calorie expenditure at the Washtenaw Recreation Center. On a trip to the Ann Arbor News, they discovered that almost every job related to newspaper production now involves some kind of math. Besides seeing and experiencing many variations on "when we'll ever use this stuff," they also got plenty of insight into possible jobs and careers that might motivate them to get prepared.

This is making the need to learn culturally convincing. Conviction about need will drive demand.... They are working on something because it is something they *want* to work on.... There are a lot of well-trained curriculum experts and others who know a great deal about math, but ... what is missing from their work is insight into the minds of the young people they are trying to reach.

- Robert Moses, 2001, pp. 102–103

We all need to *listen more* to the young, and to get to know them well enough that they will really talk to us. Comments from the algebra students, part of the *Voices* running down the right side of all these pages, are eloquent about how eye-opening these weeks were for them. It is worth reiterating the message we receive over and over again from young people (not just this group): (1) *they don't even know what or how much they don't know*, and (2) *they have no one to ask for help*. We need as many ways as possible to assist them with both dilemmas. They need the time and caring attention of others—and school is not the only possible venue for that vital interaction.

The community organizer seeking an innovative breakthrough in education will use the principle of "cast down

lost just about every day. I can't believe how far back I had to go to start catching up in math. The pathetic thing is, before I came in here I didn't know how far behind I was! And I don't feel dumb about it. It's skills, you know, and I don't think I ever really got them before.

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**I quit trying to get help. This summer, it's different.**

Summer algebra student

When I try to get help, it's like nobody can help me. So I quit trying to get help. This summer, it's different. When I need help, I can get it. I think these teachers are, well, different. They know how we think and they know how to break things down so we can get it. I really like it, the way they are showing us how to do things.

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**I'm thinking that maybe I better ask my teachers to let me sit up front so I don't have so many distractions.**

Summer algebra student

Because I'm so visual, it's like I'm seeing and taking in things all around me all the time. I guess you can say I can get distracted, like if I'm sitting in the back of a class and I'm seeing all these kids in front of me and what they are doing and things like that. Then, I'm not watching the teacher, you know, and listening and focusing. I'm thinking that even when we have assigned seats, maybe I better ask my teachers to let me sit up front so I don't have so many distractions. That's something I'm learning about me this summer, I guess.

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**We aren't rushing through everything.**

Summer algebra student

I don't do very well with lectures, you know? But if I can see things, it helps me learn it. I like it how we are explaining things this summer—like, step by step. Then they let us

your bucket where you are." The organizer becomes part of the community, learning from it, becoming aware of its strengths, resources, concerns, and ways of doing business. The organizer does not have the complete answer in advance—the researcher's detailed comprehensive plans for remedying a perceived problem. The organizer wants to construct a solution with the community.... This is a long journey and not a linear progression.... [In order to get to] *all* the students, we need the community's political involvement and clout.

- Moses, 2001, pp. 112–113

We could not better describe the concept of learning community or the rhyme and reason of *Reach Out!*

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### **8. Provide for personal and career exploration.**

We have already noted above how our most refined strategy for this works. Individualized career mentoring by community adults works extremely well, in the estimation of mentors, mentees, community shadowing and tour providers, and the parents of the teen participants.

Parents and teens begin warily but end up pleased and grateful. Mentors also start with trepidation, many because they are a bit afraid of how it will be to interact with teens. Media images of teens tend to be so negative and stereotypical! But mentors have, without exception, really enjoyed the experience; many return to it regularly.

Some see it almost as a way to atone for mistakes they may have made as parents. They are in a stage of life (middle aged to retired) where they finally have free time to enjoy and to share, in a way they did not as young parents. They speak of this mentoring as "something we can do for each other's kids" —partly because of the time factor and partly because, when our children need this guidance most, they may be least ready to accept it from their own parents.

He was drifting away from us and didn't want to talk to us ... thinking that we just don't get it and understand him. We needed some other adult to be in his life.

- Parent of a career mentee

This is not entirely because of teen angst or their sometimes rocky separation from

do it, step by step. Then if we need help, we just say so, and they help walk me through it, maybe in a little different way that will make sense to me. Then I like to try another problem kind of like the ones we worked on. Later, I like to see if I can still get it and do it. We aren't rushing through everything.

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### **You are helping us see why we need math.**

Summer algebra student

I think it is really good that you are trying to take us out to learn about businesses and jobs. I don't think any of us really know what is out there. I mean, maybe we know what our moms and dads do—even some of us don't know much about them, either. And I think it is really good that you are helping us see the why—I mean why we need math. On the Kroger trip, that was really hard! It really got me thinking, though. Don't you just shop to pick things up? Do you think about comparing unit costs or things like that? It was hard!



*Middle school teacher Doris, Kiwanis coordinator Gene, & Slauson MS career mentee Melanie*

us into individuality. There is also a subconscious desire to please us, or to not disappoint us, that can hamper free thought and honest communication about who *they* might want to become, independent of our expectations.

Many career mentors worry about and regret messages they sent their now-grown children when they were teens. They realize during our mentor training (which mostly consists of taking them through the process they'll use with their mentees) that they made a lot of assumptions and hasty judgments about their own children and grandchildren.

I thought these kids or grandchildren of mine were "smart" and these others weren't so smart. Now I can see it's style. What have we told them? Their whole outlook about themselves for life and what careers or jobs they think they can go into can ride on what we have thought about being "smart" or not.

- Kiwanis career mentor

They reflect on how much they and their own children needed things like this mentoring program way back when. They see their adult children struggling in careers to which they are poorly suited and wish they had offered more and/or better guidance.

I just didn't think this child of mine was, say, "college material." Why? Because of grades, or poor scores on tests, or what I thought was their not trying hard enough or being focused on school work. Now I think about how they do learn, and maybe it isn't the way that we teach in school or college. But if subjects were taught differently, they could do well in this or that subject.

They reach an awakening about when and how they learned best—that, often, they didn't "get" something in or because of school, but only later, when they applied it on the job.

Thinking about hands-on or experiential learning, Karyl is right: the best brain surgeons and orthopedic surgeons learned from hands-on. I had thought of hands-on learning for the skilled trades. Those aren't lesser jobs, but I thought that if you didn't do well in school, maybe you would do well working with your hands. Many touted professions have plenty of hands-on and experiential learning baked into their formal education programs—certainly in medical and dental school it is key. And we hold them up as our brightest students.

Career mentors, too, appreciate the need for reflection—across all our mentors, staff, partners in the community. They note how busy and rushed everyone seems these days.

We just get too busy to slow down and enjoy and invest in one another, to learn from one another, to support and encourage one another.

**Honestly, there isn't anybody to help you at school, not really, and you either wear down or give up.**

Summer algebra student

This summer's math has really been fun. It isn't a classroom atmosphere. I really like, and need, the one-on-one. I'm not as scared to ask for help or to admit I don't understand something here. In school, I get scared a lot in math and science classes. I feel dumb, and then sometimes I just feel like giving up and just hanging out with my friends. After a test, if you didn't do well, nobody is stopping to say "Why?" or, "What don't you get, so we can stop and help you get it?" It's so frustrating that you just give up. And it all starts, well, right away—like the first day! You hear what you have to do and how much and when there are tests. Go home. First homework assignment. You're lost or stuck already, and there you go. Honestly, there isn't anybody to help you [at school], not really, and you either wear down or give up.

I liked talking about learning styles, too. My eighth grade science teacher let us do some surveys and talk about learning styles. He told us he was dyslexic and had a really hard time in school with reading and with tests. I'm glad he could tell us that and tell us that it took him a long time to realize he wasn't dumb or anything. I'm a visual learner and a hands-on learner. I can see that I am getting better with auditory learning, too, but I just do my best the other way. It's like teachers teach the way they learn. If we don't match them, well, we are going to have a hard time. I wish we could pick teachers for subjects that teach the way we learn. I think it would be so much better.

**The field trips were very effective.**

- Parent of summer algebra student

I think [she] learned a lot from her summer experience. She now feels competent at some of the skills she

Teens, teachers, college students, Kiwanis members working or retired—we all gain from slowing down, working together, serving together, and reflecting together.

Those interested in creating a similar partnership can find more explanations and a detailed timeline and tasks on our Web site, at

[www.eecs.umich.edu/mathscience/exploringsci/mentoring.html](http://www.eecs.umich.edu/mathscience/exploringsci/mentoring.html) and  
[www.eecs.umich.edu/mathscience/exploringsci/MenProcess.html](http://www.eecs.umich.edu/mathscience/exploringsci/MenProcess.html)

There are other, less individual ways to promote the personal discovery and career exploration that we recommend for young people. The purpose common to all is to address the motivational problems that can interfere with academic achievement. If students see no personal relevance to their studies, it is difficult to stay motivated to work hard at it—even if their aptitudes and skill levels present no problems. Helping students to develop their own career goals can make all the difference.

Other ways we have approached this include

- Soliciting tours, career presenters, and job shadowing opportunities, which we post on our Web site so that anyone geographically within reach can make arrangements themselves to take advantage of them.
- Sponsoring Career Clubs, usually during or after school at an elementary school, which take a small group through some exercises in thinking about possible futures for themselves, bring in some career presenters, and take a few workplace field trips.
- Career fairs, held at secondary schools or teen centers, where teens can meet people from many career fields to ask questions about the nature of their work.
- Personal Discovery workshops, where a small group of teens can go through some on-line diagnostic instruments and discuss the implications of their results.

As with most of what we do, the content of what they learn is probably less important than the attitudes they form. These kinds of exploration experiences bring home to them that *they must act* to shape their own lives. Some of our Kiwanis mentors have noted how passive and victim-like teens seem to be at first—“They are buffeted through life.” They learn to take charge of themselves and their futures—a change of incalculable worth, no matter what they end up pursuing.

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did not master in the 8<sup>th</sup> grade. The proof in the pudding will be how she performs in high school next year. My sense is some of the field trips were very, very effective at reinforcing the need for math skills as well as even other skills. And, she learned a lot about careers that she never had thought about before.

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**I don't trust adults much. They say they are there for you, but they aren't.**

Summer algebra student

I don't trust adults much. Sometimes they act like they care, but they don't. They say they are there for you, but they aren't. People here are people who really care and I can see I can trust them. They are here and they help us and they are, like, straight up with us on what we can do and learn and what they can do to help us learn. Trust is a gift and you have to be careful who you give it to. You can tell if somebody is real if you see them everyday, and in different places or situations. It's like: are they the same person all the time, or do you catch them being someone different? I watch out for that. Everyone here, you can trust them.

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**I'm taking down my own "I hate math wall."**

Summer algebra student

I had a big wall up about math. I've been so frustrated and I've been so behind. I have a learning disability, but now I say I have a learning difference. I mean I can learn math, but it can't be in a big group. I need teachers who will actually help me one-on-one if I need it, or give me more time or different ways to learn something. I'm not dumb, you know. I think I'm really smart but I can't do it with lectures like that or big classes. I can see that math is like a key that I just have to have. I don't think I really have a choice. Just about anything I want to go

### **9. Use technology to widen your reach and to report on your efforts to the community.**

When we first established a Web presence for our programs in 1995, none of us knew how to do it. We got some books and some coaching from the technical support people at UM's Electrical Engineering and Computer Science Departmental Computing Organization—who also generously donated server space for what has come to constitute 10% of their Web server traffic. Today, there are a variety of user-friendly Web composer programs available and a number of free or low-cost hosting options. We highly recommend that similar programs invest in a Web presence, as it gives unparalleled visibility and communications options. You need not be particularly cutting-edge in this; in fact, we are deliberately low-tech (no use of Java scripting or even frames), because most of our “clients” have slow modem connections and/or old hardware that cannot handle the more recent, large browser programs.

As a side note, while we stopped worrying a year or so ago about our code being back-compatible with Mosaic (the original browser of choice of most of our users), we still get occasional complaints about all our tables from users of ancient *non-graphic* Internet browsers from the pre-Web, Gopher era. It seems that organizations that offer free server space to non-profits often do so through one of these programs, since it requires orders-of-magnitude less storage space when no graphics are used. So, even if you were not worried about your site being handicapped-accessible (and you should be), you would still want text alternates for all of your graphics—especially for navigation graphics like buttons—for these users. And, of course, they can't use framed pages at all. The point is that, in order to serve the widest public, you should avoid the newest capabilities in Web design.

In July 1999, we're proud to say, UM College of Engineering Dean Stephen Director highlighted our site as one of the university's “best practices” in a presentation before the U.S. House of Representatives' Commission on Women and Minorities in Science.

We have used volunteers and part-time work-study assistants to try to keep up with the Web work. It does take quite an investment of training time before people can truly be of help, however, so we recommend you only try this with detail-oriented folks who will be able to stand doing the work after

into, it's going to make me have math. I am finding out this summer that not only can I do math, but—you're going to laugh now—I like it sometimes. I guess it's like they say, if you get frustrated enough and down on something, you just say, “I hate this, or I can't do this, or I don't need this, anyhow.” But that really isn't so. If you can get something, even slower than you want, but you get it and keep getting it and see that you are getting it—see that you are making some progress, you know—you get the attitude that this isn't bad and I can do it. That's what I see for me this summer. That wall is coming down, not as fast as you'd like, but I'm telling you, I'm taking down my own “I hate math wall.” There. Aren't you happy? I bet that's what you were hoping I'd get out of this! [big, big smile]

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#### **Sometimes what you think is most on my mind just isn't.**

Summer algebra student

When you need help, you need to know who you can go to and know they will be there. I like that here. You can get advice if you want it, or just talk, or get help with school, or talk about what's going on or what choices you have, [including] choices you didn't think you had. Teachers and parents don't know what we're dealing with. I mean, we aren't just dealing with school or sports. We can get drugs so easily. Every weekend there are parties, and everybody is drinking and doing. I'm just saying that we are dealing with lots and, well, sometimes what you think is most on my mind just isn't. It's like: who are my friends and how can I find different friends?

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#### **Nobody has really talked to me or made me think about me.**

- Middle school career mentee

I really didn't know what to think but [my teacher] thought [career

you have made that investment. Some people actually enjoy it, so look for them!

Technology can be of great help in efficient management of large programs. For example, we distribute mentor and mentee application forms through our Web site. Originally, they were bit-mapped facsimiles of our forms; now we create PDF files of them and link directly to where users can download the free Acrobat Reader, should they not yet have the program. We still want them mailed in instead of submitted electronically (because we want a signature on the code of conduct), so there is no need to go to electronic filing of forms. If it is too difficult to print out, fill out, and mail in or deliver a form, then the applicant is probably not suited to the program anyway.

Another aid to program organization is the file sharing of databases. We cannot afford one person to do all our data entry, so we keep the dozen or so current databases on one computer, set up for file sharing by site coordinators with password access. Again, a certain amount of training in the program is required up front, but it simplifies record-keeping enormously. Similarly, allowing coordinators to submit weekly attendance and feedback forms by e-mail has increased the timeliness of their responses! That is also how we gather the majority of our volunteer evaluations and feedback—which responses are always valuable in helping us to gauge and to improve the effectiveness of programs.

We are especially pleased, however, with the community response to our posting of periodic evaluations and progress reports on the Web. Feedback demonstrates to us that a surprising number and breadth of people are the audience for such reporting, which tends to bring us credibility and new partnerships.

mentoring] would be good for me. Well, I'm really glad I did this now. This was way different from anything we've done [at school]. I mean, we just meet and we sit and we talk and he listens to me. He really cares about me, I mean, who I am and who I want to be, like what I can do and what I could do in a job. I've done a lot of thinking this semester about me, like how I learn best and how come it's that way. Like what am I really good at—what am I *really* good at—and how I could go into some job that would use that. Nobody has really talked to me or made me think about me, my jobs, and I guess I just didn't think about that. But I like to think about it and I think it isn't that way off. I mean I'm going to be out there pretty soon and what *am* I going to do? I liked learning about jobs and colleges and places you can go for skills and things like that. I don't know if I'll go to college, but I think I might. If I do, I know I have to have some okay grades and stuff. But I also might do some other things that I really didn't know about before. I've thought about building houses and things like that, but maybe I'd like to design houses



*Kiwanis mentor Si, middle school teacher Doris, and Slauson MS career mentees Emily, Bonnie, Marly, & Kiesa*

In addition to the 50 United States, Puerto Rico, the Virgin Islands, and Guam, Web-site users have come from Argentina, Australia, Austria, the Bahamas, Barbados, Belgium, Bermuda, Brazil, Brunei Darussalam, Bulgaria, Canada, Chile, Colombia, Croatia, Cyprus, the Czech Republic, Denmark, Egypt, El Salvador, Estonia, Finland, France, Germany, Greece, Guatemala, Hong Kong, Hungary, Iceland, India, Indonesia, Iran, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Korea, Latvia, Lithuania, Macau, Macedonia, Malaysia, Mexico, Namibia, the Netherlands, New Zealand, Norway, Pakistan, Panama, the Philippines, Poland, Portugal, Romania, Russia, Saudi Arabia, Singapore, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Syria, Taiwan, Thailand, Trinidad/West Indies, Turkey, the United Arab Emirates, the United Kingdom, Uruguay, Venezuela, and Yugoslavia—that we know of.

This user data comes from our on-line guestbook, from e-mail to the webmaster and other contacts listed on the site, and from loggate reports generated on the *Reach Out!* site only. We cannot get such specific reports on the major part of our Web presence, which is on a different server. Scores more countries are represented in the EECS Web server traffic reports (<http://www.eecs.umich.edu/stats.html>), but we don't know which ones are "ours." The Directory Report shows that requests for pages or parts thereof within our alias directory (mathscience) and our "real" address (-coalitn), combined, constitute 9–13% of the EECS Web Server's total traffic each month. For a 239-day period stretching from May 2001 to March 2002, traffic on our Web site consisted of 16,496 successful page requests (average) per day, which extrapolates to **more than 6,000,000 successful page requests per year**. Statistics for the separate *Reach Out!* site show that some 9,500 distinct users request some 12,500 pages per year. The counters placed somewhat belatedly on both home pages have recorded more than 180,000 hits, but most people reach us several layers in, through search engines. The bottom line: tens of thousands of people worldwide peruse our Web resources every day—many more than we could ever reach by conventional means.

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### **10. Expect bumps in the road.**

True partnership is never easy. We have had difficulties at every one of the dozens of sites at which we have worked. You must focus on defining and overcoming the roadblocks,

or be the owner of a company that adds onto houses and builds decks and things like that. Maybe I'd like to plan subdivisions or be an architect, you know? This was a real different experience. I mean, I really liked talking and thinking about me and finding out about jobs out there. I think every kid should have this. I don't think anybody is really thinking about this stuff and we should be. I mean, it's our lives, you know? Maybe somebody could think we're too young or something, but I don't think so. We need to be thinking about this stuff. Well, I learned a lot and I'm really glad I did this.

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### **If they need some extra help, it just doesn't happen.**

Father of summer algebra student  
I'm so happy this program is available. I know that math is so important and if you don't feel good about it, you will find lots of doors closed off to you. Our school is just so big and the classes are so big. If you need that personal touch or maybe some extra help or individual time, well, it just doesn't happen. I've helped my kids from time to time, and sometimes I just don't know what pieces they are missing, but I know they are. When you move on to something new and you didn't really get what was just covered, you get behind and things coming up don't make sense, you know what I mean? I'm hoping that the kids can stop a minute and figure out what they need more help on and get that help.

### **I can get so down when I feel like I'm getting lost and behind.**

- Summer algebra student  
The new insight I really got this summer was that I am very smart. And I have got to look up more, be more positive in school, ask questions, go see my teachers. And I have to lighten up on myself, I can get so down when I feel like I'm getting lost and behind or then I just

which is usually easier when you confront, without being judgmental, the partner with whom you are having difficulty.

The best example would probably be our toughest case, an independent, well-established community center. Because it is relatively well-funded and has a decades-long track record, it serves hundreds of children year-round. Consequently, it is always very crowded and chaotic, and many children are essentially in day care there. Children have been, against our wishes, “assigned” to our science club, intensifying attitude problems. Children of too wide an age range for the effective design of activities have been forced upon the club. We have had to work in part of a very large space, while martial arts and other noisy pursuits went on simultaneously. Center employees have interjected themselves with what we consider inappropriate attempts to impose order or discipline. These were all serious problems—usually a new one each year. As each problem has been solved or at least tempered, it seems that a new one arises. Coordinators burn out at this site, frustrated at their inability to make things work as they would like.

So, periodically, we withdraw from the site, recharge our batteries for a semester or a year, and then plunge back into the fray. We don’t consider this a failure, an abandonment, or the equivalent of “taking our ball and going home.” Rather, it is an example of moving on when that seems best for all, without burning bridges or leaving hard feelings behind. We usually come back, with new people or a new variation on programming, and try again. Even during our least organized years, programs there have been absolute favorites for some children and some volunteers. The surface appearance does not adequately capture all that is going on. That’s why we keep coming back, even though we will probably never have a smoothly functioning experience there!

At other sites, we have gone in for group debriefings at the end of the year where it is obvious that our partners feel guilt and shame for “not holding up their end of the bargain.” These sessions are always cathartic, as we point out how much they did manage to do, and under what duress. Public school teachers and principals are particularly prone to blame themselves for not doing enough—when they do so much! They are clearly accustomed to being blamed for all sorts of things and to focusing only on perceived failures. They are so relieved to recognize how much good has been accomplished and to find that we are not judging them. Schools are also very tough to have an impact upon, but this is one reason we keep trying—they need us!

say flat out that I’m stupid or I just can’t do math and things like that. I know now that that isn’t true, it’s a lie, I am smart. I just need more time sometimes.

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**I feel like I’ve got a new shot at this.**

- Summer algebra student

I feel like I’ve got a new shot at this whole math school thing. I didn’t feel like a player before, to be honest. I mean, I went ‘cause I had to, but I didn’t get it and I don’t think I even cared that much about it. I do now. I mean, I’d better if I want to do what I want to do with my life.

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*Career mentee at the veterinarian’s office*

## IV. Final-Year Programming

We decided some time ago, regarding the approaching “sunset” of CUOS and the possibility that our outreach programs may not live beyond that, to keep “running flat out” until the end. If we are unable to secure funding to continue, we will have no regrets about what we did not accomplish because we were “winding down.” Accordingly, we have been busier than ever in 2001–2002, especially since we are running programs with reduced staff.

### A. Coalition Meeting Saturday, Oct. 13, 2001

The Southeastern Michigan Math-Science Learning Coalition was hosted by the Washtenaw County 4-H Extension Office. We featured our support for the national Afterschool Alliance program and the Lights On Afterschool! public awareness campaign in October. Both of these are part of the C. S. Mott Foundation and the U.S. Department of Education 21st Century Community Learning Centers initiatives. Our program focus was on after-school clubs and programs in our area, with presenters from the Family Learning Institute of Ann Arbor, the Pontiac Environmental Youth Task Forces, *Reach Out!* Science Clubs, and the 4-H training available for clubs and community groups based on the Search Institute’s “Asset Approach.” Dan Bassill also drove all the way from Chicago to talk about the extensive Tutor/Mentor Connection program he coordinates there.

Coalition meetings are a way to present ideas and possible formats to people interested in working with youth, while giving them new contacts who can mentor them through establishing similar programs. Attendees are always an eclectic group, so we learn much from one another. It is also a rare opportunity to showcase and celebrate our successes!

### B. Pontiac Youth Task Force on the Environment/Engineering Wizards

We cosponsored a second Pontiac Youth Task Force on the Environment ([www.eecs.umich.edu/mathscience/YTF/ytf.html](http://www.eecs.umich.edu/mathscience/YTF/ytf.html)) in fall 2001. Thanks to a new UM funding source, it had more of an engineering focus this time. CUOS scientist John Nees was a 2000 participant in UM’s Michigan Road Scholars Tour ([www.umich.edu/~govrel/facultytours.html](http://www.umich.edu/~govrel/facultytours.html)), as was longtime science club organizer Bill Schultz ([www.eecs.umich.edu/mathscience/scienceclubs/maple3.html](http://www.eecs.umich.edu/mathscience/scienceclubs/maple3.html)). This program takes faculty on a five-day trip exposing them to the state’s economy, government and politics, culture, educational systems, health and social issues, history, and geography. Intended to encourage service to the public, it also offers funding for projects that foster connections between the university and communities outside of Ann Arbor. John applied and received support for an Engineering Wizards program to develop a partnership between UM, General Motors, and Pontiac schools to involve children in both learning and teaching hands-on lessons in engineering, math, and science. This project built upon the Youth Task Force model piloted in winter/spring 2001, which allowed a multiage group of Pontiac children and teens to do experiments and to study on site problems related to environmental concerns in their city.

Then Mayor Walter Moore completely supported this program from the very beginning. The City of Pontiac Municipal Government provided \$15,000 for the first group and \$10,000 for the second one, not to mention exceptional support from many city employees as participants explored issues at city government sites and met at the public library.

The second Task Force, lasting three months, centered around General Motors and environmental issues related to the auto industry, particularly the recycling of both automotive parts and plants. Ten

middle and high school teens, along with three Big Brothers, met with General Motors content experts at the library during weekly sessions, as well as at the local GM Truck Plant. Each week, students shared their research and findings about particular topics of interest to them, engaged in related hands-on science projects, and worked on a long-term project of putting together a model car or truck of their own and then identifying just what parts and components could be recycled. Students were very interested in careers related to the overall automotive industry. Tours of the GM plant, along with those of Schrams Automotive Recycling and of Ferrous Process and Trading, introduced the teens to many fields of interest to them.

Participants prepared poster presentations and exhibits of their model cars and findings related to recycling. Although very nervous while setting up these tables, the students came to enjoy mingling and “networking” with council members, the mayor, and many citizens who attended the council meeting that evening.

Pre and post content and career information surveys were given to all students in the Task Forces. In both sessions, none of the children knew about the topics that they were going to study at the beginning; there was limited understanding of pertinent concepts and skills; they did not know about the range of careers and jobs affiliated with each session, and they had not visited any plants or companies that were part of the program. The information gathered from the post surveys were incredibly rewarding for all involved. Further, the students noted the sense of empowerment that they experienced by conducting research, preparing findings, and giving a report to the City Council. They also enjoyed meeting new friends and being on their local cable television. The manager of Oakland County Solid Waste Management Planning has asked that this YTF group present next May at the Michigan Recycling Coalition Conference that is going to be hosted in Pontiac at the GM Centerpoint Campus. Pontiac Program Coordinator Susan Shoemaker, who is also a Pontiac City Councilwoman, submitted the pilot Youth Task Force for a National League of Cities Innovation Award. We are proud to report the resulting special invitation to participate in City Showcase 2001, an exhibition of innovative city programs from across the country, at the NLC Conference in December 2001 in Atlanta, Georgia and the reporting on this program in the Dec. 24, 2001, issue of *Nation's Cities Weekly*.

### **C. Science Clubs**

We have continued to offer weekly science clubs for children at Arrowwood Hills, Bryant, and Pinelake Village Community Centers, as well as at Hikone Recreation Center. Two new Lunch-time Science Clubs have been offered at Pattengill Elementary School, as was volunteer support to children in choosing and implementing science fair projects. Recruiting was done as usual at FestiFall (the semi-annual organizational display on the Diag), at the Serve It Up display of community service opportunities, at WinterFest, and at our own Mass Meeting; the first-time NorthFest on North Campus was unfortunately scheduled for Sept. 11 and, therefore, canceled shortly after set-up.

### **D. Computer Challenge Clubs**

For the first time, we tried recruiting for the nonprofit Computer Challenge Clubs, which help middle and high school students to build computer skills, to develop leadership and teamwork, and to explore careers in information technology. We had attempted previously, with very limited success, to work with a student computer group to bridge the technology gap between advantaged and disadvantaged children. This new collaboration was intended promote our common aims of technical literacy and career

awareness for teens, while offering our UM volunteers another format in which to serve and get to know their community. Because days and times were not finalized early enough, most prospective volunteers committed to science clubs instead, but we do not regret the effort.

## **E. Teen Academic Mentoring**

Proving to us once again that it is people who make things happen, our academic mentoring program at Pioneer High School had difficulty surviving the loss of both longtime site coordinator (to graduation) and teacher sponsor (to retirement), while there was also great turnover in teaching staff and principal.

Both our numbers and our effectiveness were down in Spring 2001—and it did not help that our new site coordinator ended up hobbling about on crutches for much of the semester! It seemed appropriate, then, to de-emphasize this program for fall 2001. Our focus was on continuing established relationships, where we can be most effective. Accordingly, we matched several of our summer algebra participants, most incoming ninth graders at PHS, with mentors. Returning mentoring pairs at the Neutral Zone have also received the minimal support they have required, and several new pairs were established among our Slauson Middle School Builders Club participants. Fifteen pairs met during fall 2001, and 15 pairs in winter 2002; 13 of those were continuing from the fall. For the first time, the majority of academic mentors have been business and other community folk, many of whom were attracted to us by our listings on the Mentoring.org and Volunteersolutions.org Web sites.

## **F. Slauson Middle School Builders Club**

Program Director Jeannine LaSovage (also a Kiwanis member) continues to cosponsor this club with SMS teacher Doris Sprentall ([www.eecs.umich.edu/mathscience/DAAK/SMSbuilders.html](http://www.eecs.umich.edu/mathscience/DAAK/SMSbuilders.html)). It meets after school to plan and implement service projects, especially at the Veterans Administration Hospital and at the Anna Botsford Bach Home. Kiwanis members are anxious to provide club members with career mentoring, but we have put this off until we know whether we will still exist in the spring, since it requires so much training and logistical support from so many people. Ten club members are meeting regularly with math mentors and, as of mid-March 2002, doing very well in their classes.

## **G. Detroit World Outreach Career Exploration Center**

This Learning Community Partnership seeks church involvement in a simple and effective system to help youth to discover their gifts, talents, and abilities; to establish personal short- and long-term goals for their lives; to see the relevance of school and learning to their futures; and to develop a network of caring adults who are available to assist them in all of this. The initial target audience is the members of Detroit World Outreach who are willing to share their careers and work places via job shadowing and tours with children involved in their middle school youth group. The church members will volunteer their time as they receive training and actually provide youth with workplace tours and job shadowing experiences. We shared our techniques and created specialized forms for interviewing prospective volunteers. If we are able to continue our work in 2002, we will add these resources to our on-line career exploration pages and directories.

## **H. Wayne State University's HealthFOCUS Conference**

On October 6, 2001, for the second year, *Reach Out!* staff presented at HealthFOCUS: Health for Our Children in Urban Settings, sponsored by the Children's Hospital of Michigan, the Detroit Medical

Center, and Wayne State University. We were brought to this by *Reach Out!* founder and alumna Aarti Raheja, now at WSU Medical School. We share our science club model, plus ideas for health and nutrition outreach that doctors can do within their communities and practices, and we invite them to work with us on programs in both our community and in Detroit. For example, three medical students have volunteered as Camp Discovery counselors, doctors and students use our Web site and lessons/activities for their outreach programs, and we share some career exploration resources.

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## VI. Appendices

### Appendix A. Peer Review of Our Programming

An almost-final review of our programming and achievements took place on Oct. 27, 2001, on campus.

Presenters were

Jeannine LaSavage, K-12 Outreach Director, Reach Out! Advisor	Overview, Mission and Goals
Martha Toth, Program Associate, Webmaster	Technology: Supporting People and Programs Efficiently and Effectively, and Reaching the World
Susan Shoemaker, Pontiac Program Manager, Pontiac City Councilwoman	Pontiac Learning Community Coalition and the Owen Elementary Coordinator/Resource Center Model
Debra Hamann, Elementary Program Manager, Reach Out! Coordinator UM Engineering Graduate	<i>Reach Out!</i> : Empowering UM Students and Leading the Development of the Ann Arbor & Ypsilanti Learning Community Coalition
Aarti Rajeha, UM LS&A Graduate, Wayne State University 3 <sup>rd</sup> Year Medical Student	<i>Reach Out!</i> Pioneer and Personal Testimony of Programs Designed and Rescued, UM and Community Partnerships, Research Experience for Teachers, and Continuing Relationships as a UM <i>Reach Out!</i> Alumna
Ben Kaufman, UM College of Engineering Graduate, GM Engineer	Science Clubs in Schools, Churches, and Subsidized Housing Community Centers; Developing UM Student Organizations into Stakeholders; and Continuing Relationships as a UM <i>Reach Out!</i> Alumnus
Karyl Shand, UM College of Engineering Graduate	Teens: Pioneer High School Learning Community Model, Academic Mentoring and Community Resource Credit Classes, Personal Discovery Workshops and Slumber Parties, and Business Partners for Career Exploration
Jerry McMahon, Simon Eaglin, & Jerry Hartweg, Kiwanis Partners	Business & Community Model for Career Mentoring, Career Fairs and Panels, and Workplace Tours with Lessons to Demonstrate Math and Science Relevancy
John Nees, Research Scientist	Being a Scientist and a K-12 Educator: Programs, Partnerships, and Sharing the Joy of Science with Teachers, Youth, Parents, and Community Members
Greg Spooner, Research Scientist	Projects and Experiences to Challenge Perceptions of "What is Science, Who Does Science, and How Do We Learn Science?"
Debra Hamann	Orientations, Training, and Program Evaluation
Doris Calvert, Community Developer	In Conclusion, a Mother & Community Leader's Testimony

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The review panel included

TaShara Bailey, Engineer, Student Support & Development, Minority Engineer Program Office, & Representing Levi Thompson, Associate Dean for Undergraduate Engineering, UM

John Barfield, Chairman Emeritus, Bartech Group

Barry R. Borgerson, President, Complete Leadership, Inc.

Sharon Burch, Program Director, Engineering Undergraduate Education, UM

Henry Caudle, Principal, Pioneer High School, Ann Arbor Public Schools

Lisa Dengiz, Director, Ann Arbor Neutral Zone Teen Center

Bob Galardi, Principal, Pattengill Elementary School, Ann Arbor Public Schools

Jeffrey Howard, Assistant Director for Academic Service-Learning, Editor - Michigan Journal of Community Service Learning, Edward Ginsberg Center for Community Service and Learning, UM

Ann Kirchmeier, Coordinator of Administration & Education, Materials Research Science and Engineering Center for Sensor Materials, Michigan State University

James C. MacBain, Director for Research Relations, College of Engineering, UM

Charles Moody, Director of Science Curriculum, School District of the City of Pontiac

Tracey Patterson, Coordinator of Education, Engineering Research Center for Reconfigurable Machining Systems, UM

Tim Vandekerckhove, Detroit Edison

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## 1. Summary of Findings and Recommendations

### A. Strengths and Positive Findings

1. *K–12 Center’s programs and strategies align well with and have been successfully implemented to achieve mission and goals.*

- The center stayed focused on math and science and it reached out to a broad spectrum of K–12 students. It managed to reach many groups underrepresented in technical fields without excluding anyone, partly through its choice to operate at subsidized housing and predominantly black church sites.
- Reviewers noted and approved of the emphasis on learning the scientific method over scientific facts.
- Programs addressed both math and science learning and the affective issues that so vitally impact academic achievement: student views of their own abilities, the responsibility they take on for their own lives and futures, their aspirations, and their network of support for when they need help.
- Attention to motivation through career exploration is a promising strategy for improving student willingness to expend the effort required to master difficult, technical subjects.
- The consistent emphasis on *relationship* is characteristic of Center activities and shows potential as a tool apart from the content of programming. Because of the variety and history of programs, the Center is now seeing, at the high school level, youth who have been involved for several years in summer camps, science clubs, career exploration programs, and academic classes outside of school. These “veterans” should achieve the best overall results from the multifaceted interventions. (Now is the time to gather data, in cooperation with other university groups skilled at such research; see Recommendations section.)

2. *The Center achieved an extraordinary range of long-lasting and genuine collaborations with diverse groups*

- The authenticity of partnerships is indicated by the evolution of programs over time—both to adapt to what had been learned through experience *and* to accommodate the needs and to take advantage of the expertise of partners.
- The CUOS K–12 program crossed boundaries and engaged other service groups in a manner unprecedented in National Science Foundation Center experience. Bringing in Kiwanians who support joint programs with both funding and dedicated volunteers is a prime example.
- Even those of us with some previous familiarity with one or more Center programs were surprised at the number and diversity of community groups that had worked in partnership with the Center. Examples include schools in several districts, other universities, AmeriCorps and 4-H Extension programs, *many*

businesses, service groups, recreation centers, subsidized housing community centers, churches, and other coalitions.

3. *There is considerable evidence of parents and other community adults assigning greater importance to science and math, and getting more involved personally in young people's learning and planning for the future.*

- A great many adults have volunteered as career exploration resources (listed on the Center's Web site), offering to share knowledge of their own career fields with youth.
- The commitment of Kiwanis volunteers to extensive and very personal guidance of children unrelated to them is something we have not seen elsewhere.
- Encouragement and reinforcement of parents and extended family in their support of children's learning and aspirations can make a critical difference in significantly changing the cycle that has hindered the advancement in science and math education for many years. This model's importance cannot be over-emphasized, and the way in which the Outreach Center has embraced and utilized the concept is really commendable.

4. *The number and variety of UM students engaged in volunteer work was and is edifying.*

- Steady recruiting, training, and support of hundreds of undergraduate students every year in programs requiring a long-term, weekly commitment—in an era when many “volunteers” are actually paid (work-study, AmeriCorps, etc.)—is, we believe, unprecedented at the University of Michigan.
- The list of some 50 university organizations, plus numerous departments, schools, and colleges, from which these volunteers came exhibits unparalleled breadth and inclusivity. Adoption of sites by a social fraternity, an engineering honor society, a multicultural group, and two pre-med organizations illustrate this phenomenon.

5. *The effect of volunteer work on the service providers appears significant and warrants further study and documentation.*

- Young adults had some affective needs of their own met by their participation: they profited from a sense of belonging, a wider social group, a less stressful and competitive environment, a restored balance in their lives, and a sense of higher or selfless purpose.
- Undergraduate students experienced noteworthy growth in adaptability, responsibility, civic mindedness, and empowerment by planning, running, and adjusting programs and by making a commitment to be there regularly for particular children or teens.
- There were some intriguing anecdotal reports about the effect on retired volunteers of working with children, teens, and young adults, which would also be fruitful areas for research.

6. *An unsung side effect of Center programming is the “public face” it gives the University of Michigan in communities outside of its campus.*

- These young coordinators and volunteers are exceptional representatives of the University, as well as ambassadors of science. Partners testified—and reviewers saw concurring evidence in both reports and review presentations—to the effect that creative, bright, energetic, and compassionate young adults solved problems and communicated effectively with diverse groups in a variety of community settings.
- Programs that both serve and “stick” are important to the University's image. These programs give as much as they take, and they are reliable and dependable to outside partners.

7. *The Center exhibits unusually flexible and effective administrative and support procedures.*

- Staff, coordinators, mentors, and volunteers receive high-quality orientation, training, and ongoing support.
- There appears to be a healthy environment where creativity and commitment are fostered by support and appreciation.

- Individual staff and volunteers, who obviously have knowledge of the programs with which they work most closely, seem to have an understanding of how their activities fit into the overall scope—evidence of good communication and confidence in the structure, leadership, and direction of the program.
  - The quality of program support, human resources development, program tracking is very good. A good database was kept of the number of participants from the many constituencies.
8. *The maturity level of the program and the experience base of its staff position it well for providing consulting and technical assistance for replication elsewhere.*
- With its expansive programming and networks, the CUOS K–12 Outreach Program has the potential to serve as a technical assistance center for both other U-M School of Engineering K–12 efforts as well as more broadly.
  - The vision of recent UM graduates and *Reach Out!* alumni to serve one- or two-year stints as “*Reach Out!* ambassadors,” coaching others on site for an extended period while they develop similar programs, is both a unique and interesting concept for program propagation and a powerful testimony to the importance they assign to work they have contributed to.

## B. Weaknesses and Concerns

1. *The Center has not done enough quantitative evaluation of the impact of programming.*
- While applying student performance metrics to the K–12 outreach activity is understandably difficult, some procedure in this regard would have been useful. At the very least, could not the grades of the participating children have been tracked?
  - Although there were neither funding nor resources to do a formal tracking of the students who were tutored and mentored, some informal metrics might have been useful.
  - The absence of quantitative data is a glaring concern. The collaboration that currently exists in other aspects of the program should be broadened to incorporate the kind of performance information available to schools, which would provide empirical validity to the program’s efforts and results.
  - Some quantitative numbers regarding work with other organizations would have been helpful. [In response to this comment, such information was provided in an addendum, following on pages 56–57.]
2. *There does not appear to have been enough University or College of Engineering involvement (beyond undergraduates).*
- Even though a few scientists and graduate students demonstrated involvement in Center programs, the College of Engineering was not as visible as other intellectual partners.
  - Despite a very good effort in establishing a broad spectrum of stakeholders (including undergraduates, teachers, parents, people in the community, retired people), the one area where stakeholders were not sufficiently developed was in the broader University community.
  - There appears to be a disconnect between the program’s apparent impact on the community and its support within the College and the UM as a whole. It would seem that the program’s management could have done a better job at communicating with and responding to advice and guidance from personnel within the College.

## C. Specific Recommendations

- Regarding the absence of quantitative data: program staff should exercise their collaborative skills to engage (1) other university partners in the more formal study of the effects on undergraduate volunteers of their program participation, and (2) K–12 partners to track outcomes for their child and teen participants. We recognize that the Federal Educational Rights and Privacy Act limits Outreach Center access to some relevant data, but school partners should be eager to discover and demonstrate results with the data available

to them (test scores, grades and other teacher assessment of performance, enrollment in advanced classes).

- The program has appeal broader than the College of Engineering. While it appears to be a “natural” for incorporation into similar outreach and educational programs within the College, it may be best situated at a central administrative location, because it involves students and faculty from many disciplines.
- The University should take the lead in offering the Center a new “home base.” Foundation, corporate, and other stakeholder funding should be solicited to support maintenance and expansion of this exemplary program. Several reviewers believe strongly that the staff is too lean already for what the program encompasses.
- The Ginsberg Center can contribute to the further development of the CUOS K–12 Outreach Program. Efforts might include: strengthening and measuring University students’ preparation for citizenship and community participation, making available resources on reflection to engage student participants around issues related to their community involvement, and faculty development in curriculum-based service-learning.
- Center staff are clearly in possession of important information and experience regarding “best practices” in the complex areas of coalition-building and informal science education. While the Web site has been used to generously share such information, it should also be disseminated in more traditional ways, such as journal publishing. Staff might consider pursuing small grants to free up the time and personnel to accomplish exactly that.
- Center staff have the expertise and demonstrated willingness to mentor others through the development of similar programs. Doing so in the future should be less of a sideline and more a part of their core mission. A “consulting” or “technical assistance” function should be an integral part of any future Center configuration or structure.

## 2. Addendum: Sites and Collaborations

### *Schools we have worked in*

Owen ES, Pontiac (7 years)  
Chapelle ES, Ypsilanti (2 years)  
George ES, Ypsilanti (4 years)  
Pattengill ES, Ann Arbor (1 year)  
African American Saturday  
Academy, Ann Arbor (2 years)  
Beaubien MS, Detroit (1 year)  
Lessenger MS, Detroit (2 years?)  
Slauson MS, Ann Arbor (3 years)  
Pioneer HS, Ann Arbor (5 years)

### *Community centers we have worked in*

The Neutral Zone teen center, Ann Arbor (4 years)  
Pontiac Public Library (2 years)  
Peace Neighborhood Center, Ann Arbor (5 years)  
Arrowwood Hills Community Center, Ann Arbor (3 years)  
Bryant Community Center, Ann Arbor (3 years)  
Hikone Recreation Center, Ann Arbor (3 years)  
Pinelake Village Community Center, Ann Arbor (3 years)  
North Maple Estates Community Impact Center, Ann Arbor (2 years)  
Cobble Creek Community Center, Ypsilanti (1 year)  
Community Centers in Boston and Miami – Alternative Spring Break

### *Church sites we have worked in*

Community Church of God, Ypsilanti (5 years)  
Bethel African Methodist Episcopal Church, Ann Arbor (1 year)

### *University Of Michigan groups we have collaborated with*

Center for the Education of Women, Circle K, College of Engineering, Community Service Commission, Department of Electrical Engineering & Computer Science, Engineering Service Day planning group, *Eta Kappa Nu*, Golden Key Society, Hindu Students Council, Martin Luther King, Jr., Service Day planning group, Minority Engineering Program Office, National Society of Black Engineers, Office of Academic Multicultural Initiatives, Office of the President, *Pi Kappa Alpha*, Pre-Med Club, Project SERVE, Road Scholars, Society of Women Engineers

### *University of Michigan Student groups our volunteers have represented*

Abeng, African Students Association, *Alpha Chi Sigma*, *Alpha Delta Pi*, *Alpha Kappa Psi*, *Alpha Phi Omega*, Arnold Air Society, Black Pre-Medical Association, Black Student Monthly, Black Student Network, Caribbean People's Association, Circle K, *Eta Kappa Nu*, Filipino American Student Association, Golden Key Society, Hindu Students Council, Interfraternity Council, Juggling Arts Club, *Kappa Alpha Theta*, UM Marching Band, National Society of Black Engineers, Omega Chi Epsilon, Panhellenic Association, *Phi Sigma Pi*, *Pi Kappa Alpha*, Pre-Med Club, Society of Automotive Engineers, Society of Minority Engineering Students, Society of Women Engineers, Taiwanese American Students Association, *Tau Beta Pi*, *Theta Chi*, Volunteer Computer Corps, Women in Science & Engineering

### *Community groups we have provided with consulting services*

Many administrators, teachers, and board members for Ann Arbor Public Schools, School District of Ypsilanti, School District of the City of Pontiac, Saginaw City School District, Grand Rapids City School District, Van Buren Public Schools; Saline Christian School and several home school groups; many K-12 outreach people at Eastern Michigan University, Wayne State University, Oakland University, Oakland Community College, Washtenaw Community College, and University of Michigan; many AmeriCorps and 4-H Extension programs; Cascade Engineering; Computer Challenge Clubs; Detroit Entrepreneur Training Program for youth; Detroit Franciscan House; Downtown Ann Arbor Kiwanis; Ford Dearborn Rouge Plant; General Motors Pontiac Truck & Bus Group; Health Occupations Partners in Education; NBD Bank of Grand Rapids; Pontiac All Saints Episcopal Church; Pontiac First Presbyterian Church; Public Education Fund of Grand Rapids; Serendipity Reading Clubs of Ann Arbor, YES Coalition of Washtenaw County churches; Ypsilanti Community Church of God Opportunity Center; Ypsilanti NAACP ACT-SO planning group

### *Where and with whom we are working this year [amended after the fact for accuracy]*

- Pattengill ES, Ann Arbor (lunch-time science clubs, science fair advising; UM undergraduate volunteers)
- Slauson MS, Ann Arbor (Builders Club, academic mentors; community and UM undergraduate volunteers)
- Detroit World Outreach (career exploration consulting)
- The Neutral Zone teen center, Ann Arbor (limited academic mentoring; community and UM undergraduate volunteers)
- Pioneer HS, Ann Arbor (limited academic mentoring; community and UM undergraduate volunteers)
- Pontiac Public Library (Youth Task Force; co-sponsored by city government, General Motors)
- Arrowwood Hills Community Center, Ann Arbor (science club; UM undergraduate volunteers)
- Bryant Community Center, Ann Arbor (science club; UM undergraduate volunteers)
- Hikone Recreation Center, Ann Arbor (science club; UM undergraduate volunteers)
- Pinelake Village Community Center, Ann Arbor (science club; UM undergraduate volunteers)
- Serendipity Reading Clubs (we coordinate with their programs at above community centers)
- University of Michigan (provided four workshops for incoming freshmen)
- Washtenaw Mentoring Alliance and Pioneer High School (coplanning spring 2002 Career Fair for PHS, *if we still exist*)
- Wayne State University (presented at HealthFOCUS Conference for second year)

## Appendix B. Congruence of *Reach Out!* and University of Michigan Goals and Values

### 1. North Central Accreditation Process

[bold emphasis added below]

October 9, 1992 **Mission Statement:** The mission of the University of Michigan is **to serve the people of Michigan** and the world through preeminence in creating, communicating, preserving and applying knowledge, art, and academic values, and in **developing leaders and citizens who will challenge the present and enrich the future.**

In March 2000, the University of Michigan was recommended for a ten-year reaccreditation by the North Central Association of Colleges and Schools. The Institutional Requirements Report and the Special Emphasis Self-Study Report that preceded the NCA site visit, as well as the report of the visiting team, offer several insights into how the values and goals of the university are related to our outreach values and goals.

“Any discussion of the role of a modern complex university must recognize that such an institution has at least three vital missions. The first of these is to educate students in the light of certain general educational goals. The second is the preservation and refinement of knowledge already acquired, along with the production, dissemination, and utilization of new knowledge. The third role of the modern university is that of helping to define and assist in the solution of the problems of society. The familiar rubrics ‘teaching, research, and service’ are a shorthand for denoting these three major activities which the University performs.” We believe that outreach work contributes in two of these spheres: educating students and serving society. **The report specified that the university “has a goal of contributing to the growth of citizens, especially of future leaders,”** and the maturation process spurred by *Reach Out!* voluntarism and organizational leadership certainly do that. Outreach work also contributes to the university’s obligation, as a faculty report on educational goals delineated, to “prepare students who . . . have the training required to assume productive roles in society, have an awareness of the need for self-criticism, recognize their responsibilities to society and their fellow man, and will continue to develop intellectually.” The Working Group on Undergraduate Teaching and Learning discusses “observed that while higher education necessarily encouraged specialization, this alone is not a sufficient preparation for handling many-sided problems and projects of life after graduation.” We agree that disciplinary knowledge and skills are not enough, and we assert that *Reach Out!* members develop complementary knowledge, skills, and attitudes through their outreach work that will enhance both their work and personal lives. The Self-Study Report recommended that the university “foster experiences where students are required to think deeply about their goals for their undergraduate education,” which our participants assuredly do! Many have changed majors as a direct consequence of their *Reach Out!* participation: some have left engineering for science teaching; some have left teacher education for liberal arts majors; some have postponed medical school for stints with Teach for America. Many have become happier and more settled in their engineering majors as they discovered that other life dimensions can complement their technical work, resulting in greater personal happiness and satisfaction.

The core value of diversity was described as making the institution “a place where core social and civic values are articulated, debated, and disseminated.” *Reach Out!* participants eloquently testify about how they discover and define new personal values—and how they spread them by engaging their friends and social acquaintances in the work they find so meaningful. The Institutional Report expressed concern

that growth, specialization, and characteristics of the physical campus “can bring a disaggregation, a loss of sense of shared purpose and value.” Further, “**attention to connection, communication, integration, and community has become an especially important theme for a diverse and complex public research university.**” Repeatedly, *Reach Out!* participants identify integration into a community with a shared sense of purpose as the most important—and unexpected—aspect of their outreach involvement. It not only provides a sense of community on campus, in which they make friends without regard to academic specialties, but it also takes them off campus to feel part of and to contribute to their larger community. The 1990 NCA evaluation team had noted that students were “conspicuously absent from the strategic planning process,” even though **the involvement of students “in important decision-making areas of the university is an institutionally-held value.”** It may not be an “important decision-making area of the university,” but *Reach Out!* coordinators have substantial say in the planning and implementation of their outreach programs. An organization originally formed to complement the CUOS K-12 Outreach Program has, in some ways, surpassed it. Members are advised and supported by the K-12 Outreach director and staff, but they are the engine driving everything we do in Ann Arbor.

The 1990 evaluation team had **recommended that greater attention “be paid to integrating the curricular and co-/extra-curricular experiences of students so as to create a better total learning environment.”** One response of the university to this concern and recommendation was the launching of the Community Service and Learning Program. We believe that we fit a niche in the mission of the Community Service and Learning that was not being filled—service aimed at math and science literacy and learning, as well as personal and career exploration. As near as we can tell, nothing like this exists within the America Reads, AmeriCorps, Project SERVE, Project Community, and Michigan Community Service Corps programs overseen by the Ginsberg Center for Community Service and Learning. Our efforts can be seen as complementary to theirs, serving the same university- and NCA-endorsed goals.

## 2. UM President’s Commission on the Undergraduate Experience

Another response to the recommendation above regarding the total learning environment was UM President Lee Bollinger’s creation of this Commission, facilitated by Provost Nancy Cantor, which issued its report at the end of October 2001 ([www.umich.edu/pres/undergrad/](http://www.umich.edu/pres/undergrad/)). As President Bollinger wrote to the UM community in sharing this report,

[I believe] that the very health of the university, broadly speaking, is connected to how it cares for its students, and perhaps especially its undergraduate students because of their special vulnerability to being neglected. This is not, in other words, just a matter of living up to our responsibilities for educating the next generation. It is that and more. Rather the point is that even the character and quality of the research emanating from the institution will depend upon the degree to which we feel a desire to nurture, educationally, students into the life of the mind. This was my underlying motive in establishing the Commission on the Undergraduate Experience....

We must work harder at integrating the various parts of a student’s living and learning experience.... The recommendations in this report build a densely layered environment that brings our students in closer proximity to one other, to their faculty, and to the community. This vision is a strong one—to provide a tightly interwoven and layered intergenerational experience where students learn from those ahead of them and those behind.

The report noted that, “On the whole, the University errs too far in hiving off the intellectual energy and social diversity of campus life in monocultural and monogenerational spaces and settings.” The Commission asserted that the University should

- **foster a culture** (not just a policy) **of diversity through engagement** with students of varied, unfamiliar backgrounds

- offer its students the gifts of cosmopolitanism and civic imagination, providing **ample opportunities for community engagement and contributions to campus and public life**
- offer undergraduates the gift of transformation, for we need always to remind ourselves that **the goal of undergraduate education is not sheer variety of experience, but self-directed and purposeful change** [bold emphasis added above]

As noted previously, our student volunteers interact not just with a variety of other students, but also with children, teens, and adults aged from their twenties through their eighties, from a variety of subcultures in the community. They contribute to the community while developing a sense of efficacy and responsibility regarding civic life. And they are guided—by action, modeling, peer pressure, and specific counsel—to think seriously about who they are and wish to become. They are challenged in a personal and ethical way that does not often arise in their classes.

The commission laid out six goals through which undergraduate life at the university could be optimized. We believe that our programs contribute significantly to five of them.

*Goal #1 – Make the campus more interconnected, integrated, and permeable.*

Campus life at U-M tends to reinforce the segregation of academic fields, modes of intellectual work, social groups, and age-cohorts. We recommend efforts to reshape the geography of the undergraduate experience so as to encourage permeability and interaction across various divides:

- among students of different backgrounds and subcultures
- among faculty, staff, and students
- among different schools and colleges
- among curricular, co-curricular, and extra-curricular activities
- between the campus and the larger community

*Goal #2 – Connect students to the community and the world.*

Of all the boundaries that demarcate the undergraduate experience, the line between “the University” and the “outside world” seems the strongest, but it is also potentially the most permeable.

*Goal #3 – Treat the undergraduate career as a life-course journey, both intellectually and socially.*

Like the geography of campus life, the temporal course of **the undergraduate experience should embody the ideals of exploration, transformation, and connection**. Instead, curricula too often subordinate social and ethical goals to intellectual skill-building and knowledge acquisition, reinforcing the divide between “academics” and “student life.”

*Goal #4 – Equip undergraduates with good maps and good guides for their journey.*

We specifically recommend ... research be undertaken to understand the non-academic factors that affect retention and graduation rates.

... Advising remains underresourced and fragmented at the University. In the student’s early years, [it’s bad]. And then things get worse. ... Faculty often opt out of even the most rudimentary counseling role. The result—through no fault of the advising staff itself—exemplifies the inhospitality and routinization of public higher education at its worst. The Commission urges the development of policies for integrating the various advising functions, involving faculty more fully and expanding the aim of advising from administrative accounting to genuine guidance of the student’s development...

The Commission heard much anecdotal evidence—from students as well as from faculty and staff—about the tendency toward passivity and consumerism on the part of Michigan undergraduates making curricular, residential, and social choices. By contrast, **the ‘navigable university’ needs to nurture the habits of purposive reflection and proactive boldness**. It needs to nurture a community of seekers, not buyers.

*Goal #5 – Create a student community that is diverse, inclusive, adventurous, and self-reflective.*

[We believe] that the University—faculty, staff, administrators, and students—**needs to deliberately craft**

**a student community that reflects and reinforces the values that it sees as fundamental** to the undergraduate experience at U-M.

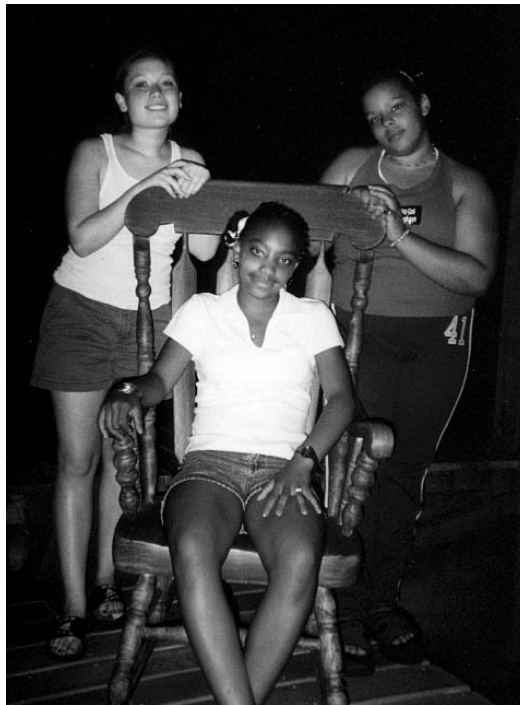
*Goal #6 – Provide resources and nurture practices that renew the faculty commitment to undergraduate education and enhance student-faculty interaction.*

The vision of undergraduate education described here asks the University to prepare and reward students for boundary crossing, the exploration of unfamiliar terrain, and the integration of academic work and everyday life. That vision can only come to pass if the University similarly prepares and rewards the faculty.

The only goal that we do not address directly is #6. We are unable to “prepare and reward” faculty for implementing the commission’s suggestions, although we think it quite evident that faculty are, in fact, implicitly penalized for putting time and energy into anything outside of research and teaching.

As for the other goals, our anecdotal reporting (the volunteer *Voices* running through this report) gives powerful testimony to the intellectual, ethical, social, and emotional growth experienced by volunteers, as well as to the extensive personal networks they develop and to the specific advising they enjoy.

*Right: three career mentees on stage at the Purple Rose Theater in Chelsea, where they were exposed to several career fields— lighting design, scenery construction, playwriting, acting, marketing, and management.*



## Appendix C. Goals & Methods for *Reach Out!* Volunteers

### 1. Goals for UM Students

#### A. Build Character and Integrity by Learning and Practicing:

- Trustworthiness and responsibility
- Respect for self and others
- Future skills for parenting
- Confidence in personal capabilities
- Adaptability and ongoing learning
- Caring and compassion for others
- Social interaction skills that are wholesome and positive
- Humility and cooperation
- Citizenship

#### B. Develop Leadership Skills by:

- Listening and communicating well
- Solving problems and resolving conflicts
- Being a teacher, coach, mentor
- Practicing teamwork skills
- Building on assets— personal, group, community
- Being a facilitator, encourager, recorder
- Clarifying personal values and beliefs and respecting those of others

#### C. Experience Community (which promotes UM student retention) by:

- Interacting with peers from many colleges and departments in a noncompetitive setting
- Developing a social conscience: a sense of purpose and personal responsibility to one's community
- Building mutually caring relationships; being needed by others
- Developing a wider social group, including several generations, on and off campus

### 2. Methods to Achieve Goals for UM Students via K-12 Outreach & Community Service

#### A. *Reach Out!* Mentoring

1. UM students mentor teens and children
  - Hands-on science & research within science clubs
  - Academic support: math & science focus
  - Personal discovery: learning styles, talents & skills, goals
  - College and career exploration

2. UM students mentor and “coach” teachers and parents
  - Help them start science clubs
  - Learn of and utilize UM and community resources for children and teens
  - Find enrichment projects and activities for classes and after-school programs
3. Children and teens, with UM student support, mentor peers and younger children
  - Hands-on science activities and research
  - Academic support
4. Business and community members mentor UM students
  - Family-like relationships for students
  - Career exploration for students and youth
  - Research projects for students and youth

#### B. *Reach Out!* Science Clubs

1. UM students coordinate K-12 Science Clubs in schools, churches, and public housing sites.
2. UM students support teachers and parents in coordinating science clubs at lunch time, after school, on weekends, and during summers.
3. UM students support business, community, and UM faculty or staff in coordinating science clubs in schools, churches, and public housing sites.

#### C. *Reach Out!* Roundtables and Symposia

1. UM students assist with Southeast Michigan Math-Science Coalition website maintenance. This site includes hands-on science lessons and activities, community and UM programs, summer camps, resources for teachers and parents, career resources in communities.
2. UM students assist in planning and hosting Career Fairs.
3. UM students provide college and career roundtable discussions and panels for youth, teachers, counselors, and parents.
4. UM students develop and facilitate roundtables and presentations on many “educational” topics, like learning styles, hands-on learning, project-based learning, alternative assessment strategies, study strategies, and test-taking skills.
5. UM students assist with planning and hosting Coalition community recognition events and planning forums.

## Appendix D. Program Summaries 1995–2001

Obviously, we had programs before the summer of 1995, but we do not have complete records for that period. We have nearly a thousand named volunteers ([www.eecs.umich.edu/mathscience/reachout/volsA-L.html](http://www.eecs.umich.edu/mathscience/reachout/volsA-L.html) and [../vols\\_M-Z.html](http://www.eecs.umich.edu/mathscience/reachout/volsM-Z.html)) in a database for this period. Of that number, about 390 worked in one or more of our programs for more than one semester. In fact, 165 returned for three or more semesters, 86 for four or more, 49 for five or more—ranging up to 20 continuous seasons volunteering in our programs!

### 1. Science Clubs

#### A. Ann Arbor Area

Arrowwood Hills Community Center Science Clubs. 2001-02; 2000-01: [www.eecs.umich.edu/mathscience/scienceclubs/arrow00-01.html](http://www.eecs.umich.edu/mathscience/scienceclubs/arrow00-01.html); 1999-2000: [www.eecs.umich.edu/mathscience/scienceclubs/arrowF99.html](http://www.eecs.umich.edu/mathscience/scienceclubs/arrowF99.html).

Bethel AME Church Science Clubs. 2000-01: [www.eecs.umich.edu/mathscience/scienceclubs/bethel00-01.html](http://www.eecs.umich.edu/mathscience/scienceclubs/bethel00-01.html).

Bryant Community Center Science Clubs. 2001-02; 2000-01: [www.eecs.umich.edu/mathscience/scienceclubs/bryantF00.html](http://www.eecs.umich.edu/mathscience/scienceclubs/bryantF00.html); 1999-2000: [www.eecs.umich.edu/mathscience/scienceclubs/bryantF99.html](http://www.eecs.umich.edu/mathscience/scienceclubs/bryantF99.html).

CUOS Saturday Science Days 1996.

Detroit Area Pre-College Engineering Programs. Spring 1997; Spring 1995.

Future Science: Future Engineering Programs. 1996; 1995.

Hikone Recreation Center Science Clubs. 2001-02; 2000-01: [www.eecs.umich.edu/mathscience/scienceclubs/hikone00-01.html](http://www.eecs.umich.edu/mathscience/scienceclubs/hikone00-01.html); 1999-2000: [www.eecs.umich.edu/mathscience/scienceclubs/hikoneF99.html](http://www.eecs.umich.edu/mathscience/scienceclubs/hikoneF99.html).

North Maple Estates Community Impact Science Clubs. 1999-2000: [www.eecs.umich.edu/mathscience/scienceclubs/nmaple.html](http://www.eecs.umich.edu/mathscience/scienceclubs/nmaple.html); 1998-99: [www.eecs.umich.edu/mathscience/scienceclubs/maple2.html](http://www.eecs.umich.edu/mathscience/scienceclubs/maple2.html); Spring 1998; (has continued independently under Prof. Bill Schultz and friends).

Peace Neighborhood Center Science Clubs. Fall 1999-Fall 2000: [www.eecs.umich.edu/mathscience/scienceclubs/peace00.html](http://www.eecs.umich.edu/mathscience/scienceclubs/peace00.html); 1998-99: [www.eecs.umich.edu/mathscience/scienceclubs/peace98-99.html](http://www.eecs.umich.edu/mathscience/scienceclubs/peace98-99.html); Summer 1998: [www.eecs.umich.edu/mathscience/scienceclubs/peace98s.html](http://www.eecs.umich.edu/mathscience/scienceclubs/peace98s.html); 1997-98: [www.eecs.umich.edu/mathscience/scienceclubs/peace97-98.html](http://www.eecs.umich.edu/mathscience/scienceclubs/peace97-98.html); Summer 1997: [www.eecs.umich.edu/mathscience/scienceclubs/peace97s.html](http://www.eecs.umich.edu/mathscience/scienceclubs/peace97s.html); Spring 1997 Science Days with Golden Key Society; Summer 1996.

Pinelake Village Community Center Science Clubs. 2001-02; 2000-01: [www.eecs.umich.edu/mathscience/scienceclubs/pine00-01.html](http://www.eecs.umich.edu/mathscience/scienceclubs/pine00-01.html); 1999-2000: [www.eecs.umich.edu/mathscience/scienceclubs/pineF99.html](http://www.eecs.umich.edu/mathscience/scienceclubs/pineF99.html).

#### B. Ypsilanti Area

Chapelle Elementary Science Day, 1997: [www.eecs.umich.edu/mathscience/scienceclubs/chap97f.html](http://www.eecs.umich.edu/mathscience/scienceclubs/chap97f.html)

Cobble Creek Science Day with the Hindu Student Society, 1996.

Community Church of God Opportunity Center Science Clubs. 1999-2000 Elementary: [www.eecs.umich.edu/mathscience/scienceclubs/ccogkids99-00.html](http://www.eecs.umich.edu/mathscience/scienceclubs/ccogkids99-00.html); 1999-2000 Secondary: [www.eecs.umich.edu/mathscience/scienceclubs/ccog.html](http://www.eecs.umich.edu/mathscience/scienceclubs/ccog.html); 1998-99 Elementary: [www.eecs.umich.edu/mathscience/scienceclubs/ccogkids98-99.html](http://www.eecs.umich.edu/mathscience/scienceclubs/ccogkids98-99.html); 1998-99 Secondary: [www.eecs.umich.edu/mathscience/scienceclubs/ccogsec98-99.html](http://www.eecs.umich.edu/mathscience/scienceclubs/ccogsec98-99.html); 1997-98 Elementary: [www.eecs.umich.edu/mathscience/scienceclubs/ccogkids.html](http://www.eecs.umich.edu/mathscience/scienceclubs/ccogkids.html); 1997-98 Secondary: [www.eecs.umich.edu/mathscience/scienceclubs/ccogsec.html](http://www.eecs.umich.edu/mathscience/scienceclubs/ccogsec.html).

George Elementary School. Mrs. Calvert's six 3rd, 4th, and 5th Grade Science Clubs, 2000-01; Courtyard Garden Club, 2000: [www.eecs.umich.edu/mathscience/learningcommunities/george/00garden.html](http://www.eecs.umich.edu/mathscience/learningcommunities/george/00garden.html).

George School 1998-99 Classroom Science Clubs. Mrs. Archbold; Mrs. Bortz's Science Fun: [www.eecs.umich.edu/mathscience/learningcommunities/george/bortz.html](http://www.eecs.umich.edu/mathscience/learningcommunities/george/bortz.html); Ms. Brown: [www.eecs.umich.edu/mathscience/learningcommunities/george/brown.html](http://www.eecs.umich.edu/mathscience/learningcommunities/george/brown.html).

[mathscience/learningcommunities/george/brown/brown.html](#); Ms. Hubbard: [../george/hubbard/hubbard.html](#);  
Mrs. McGee's Legendary Leaders: [../george/mcgee.html](#); Ms. Williams: [../george/williams/williams.html](#);  
Ms. Winters: [../george/winters/winters.html](#).

George School Spring 1998 Science Days with the UM Psychology Society: [www.eecs.umich.edu/mathscience/scienceclubs/george1.html](#).

George Elementary School - Sherri's Lunchtime Science Club, 1997-98: [www.eecs.umich.edu/mathscience/scienceclubs/george2.html](#).

### C. Pontiac Area

City of Pontiac Youth Task Forces on the Environment. Fall 2001; Spring 2001: [www.eecs.umich.edu/mathscience/YTF/ytf.html](#).

Owen Wizard Visits to UM: [www.eecs.umich.edu/mathscience/PPS/wizvisitsUM.html](#).

Owen ES Science Wizards, 1997-98, 1998-99: [www.eecs.umich.edu/mathscience/report99/I-sciclubs.html#IF](#),  
1999-2000: [www.eecs.umich.edu/mathscience/PPS/sciwiz.html](#).

Owen Tech Wizards, 1998-99, 1999-2000: [www.eecs.umich.edu/mathscience/PPS/techwiz.html](#).

Owen ES Lunch-Time Science Club, 1997-98.

### D. Elsewhere

Alternative Spring Break Week 1998, Miami

Alternative Spring Break Week 1997, Boston

Girl Scouts Science Day 1997, Brighton

## 2. Career Exploration Programs

### A. Career Clubs

Owen ES Career Clubs, spring 1999, 1999-2000: [www.eecs.umich.edu/mathscience/PPS/cclub.html](#)

### B. Career Mentoring: [www.eecs.umich.edu/mathscience/reachout/CarMen.html](#)

Pioneer HS Kiwanis Career Mentors, fall 1999, fall 2000: [www.eecs.umich.edu/mathscience/DAAK/CarMentors.html](#)

Slauson MS Kiwanis Career Mentors, spring 1999, spring 2001: [www.eecs.umich.edu/mathscience/DAAK/CarMentors.html](#)

### C. Personal Discovery and Career Workshops

Pioneer HS Workshops, spring 1999- through fall 2000: [www.eecs.umich.edu/mathscience/exploringsci/careerclubs.html#workshops](#)

Neutral Zone Personal Discovery Slumber Party, spring 2000

Neutral Zone Career Seminar, spring 1998

### D. Career Fairs

Neutral Zone Career CONNECT Fair, spring 2001: [www.eecs.umich.edu/mathscience/exploringsci/careercon/presenters.html](#)

### E. Career Presenters: [www.eecs.umich.edu/mathscience/exploringsci/presentationdirectory.html](#)

Recruited at least 86 local people willing to make career presentations (79 still active)

### F. Job Shadowing Providers: [www.eecs.umich.edu/mathscience/exploringsci/shadowdirectory.html](#)

Recruited at least 48 local people willing to allow job shadowing (41 still active)

### G. Work-Place Tours: [www.eecs.umich.edu/mathscience/exploringsci/tourlist.html](#)

Solicited at least 69 local businesses and other work places willing to allow tours (59 still active)

### **3. Academic and Personal Mentoring**

#### **A. Elementary tutor/mentoring**

Chapelle ES: 42 mentors worked with 31 elementary students after school from fall 1997–spring 1999.

Camp Discovery: 23 volunteer counselors provided a summer day camp for 37 children from subsidized housing sites; 1999: [www.eecs.umich.edu/mathscience/discovery/99camp1.html](http://www.eecs.umich.edu/mathscience/discovery/99camp1.html), 2000: [www.eecs.umich.edu/mathscience/discovery/camp2000/2000camp1.html](http://www.eecs.umich.edu/mathscience/discovery/camp2000/2000camp1.html), 2001.

#### **B. Secondary tutor/mentoring:** [www.eecs.umich.edu/mathscience/reachout/intro.html](http://www.eecs.umich.edu/mathscience/reachout/intro.html)

144 mentors worked with 165 HS students at CUOS and other sites for at least a semester from fall 1995 through spring 1997.

256 mentors worked with 283 students at Pioneer HS for at least a semester from fall 1997 through spring 2001.

58 mentors worked with 57 teens for at least a semester at the Neutral Zone from fall 1998 through winter 2002.

7 mentors worked with 7 teens from Slauson middle school from fall 2001 through winter 2002.

5 mentors taught summer courses for 14 teens in algebra and chemistry in the summers of 1997, 2000, and 2001.

### **4. Services to Teachers and Other Community Members**

A. More than 400 teachers were served by our inservices, tech training, in-class science activities, and academic or career mentoring programs from 1995-2002.

#### **B. Research Experiences for Teachers**

11 teachers and teachers in training came to CUOS in the summers of 1999 and 2000 to learn about both optics and pedagogical research and how both might enrich teaching and learning experiences they coordinate.

#### **C. UM Sneaker Tours**

More than 100 business, community, government, foundation, K–12, and higher education guests of UM’s Office of the Vice President for University Relations were hosted in 1997–98, in workshops on using the Internet in instruction and in building community coalitions.

### **5. Learning Community Development**

This term includes meetings with individuals and with groups large and small. When people contact us, often after having seen our Web sites, we meet with them to explain what we do, to learn what they want to do, and to explore ways we might work together or that we can help them to accomplish their goals; we call this stakeholder development. Our Peer Review in fall 2001 [see Appendix A] recommended that we consider this “consulting” side of our work as a legitimate and growing function, so that we might help others replicate our kind of programming.

Such development also includes special services to partners or potential partners to build good will and relationships that might lead to deeper collaborations; regular team meetings and planning meetings with existing partners to refine joint programs; training and orientation sessions; volunteer recruiting efforts such as mass meetings and presentations at organizational events; and formal presentations of program accomplishments to stakeholder groups, especially those that have provided joint funding.

Following are some examples and details.

## A. Coalition Meetings

Date	Where	Theme	Attendees
9/14/95	Univ. of Michigan: CUOS	Brought together Ypsilanti Learning Community stakeholders and CUOS and UM people to examine whether we could continue in some form with CUOS and change our focus to math, science, technology and careers.	26
9/29/95	CUOS, UM	3 small-group sessions on tutoring, a new name, people & groups to work with.	21
11/9/95	CUOS, UM	Explored ways to facilitate career exploration, "wizard" program of traveling scientists, training and organization for tutoring and science clubs, possible Web site.	10
11/16/95	CUOS, UM	Detailed planning for science clubs	12
1/11/96	CUOS, UM	Creation of Web site prompts need for tech training so people can use it! Planning for math tutoring at CUOS, Saturday Morning Science, DAPCEP, and SummerScience for Girls. CUOS grad students propose a student outreach group to recruit volunteers.	7
3/14/96	CUOS, UM	Reports from Pontiac Owen and Detroit Lessenger schools; on attempts to work with UM partner base (MEPO, CEW, OAMI, CAEN, EECS, HKN); contacts with WSU Merrill Palmer Institute, Wayne State, Oakland Univ., Jeffries 4-H Center in Detroit.	16
6/13/96	Dow Connector Lab, UM	Tech training on using the Web, our site; also planning on tutoring, Family Math and Science Program, student outreach.	33
10/3/96	CUOS, UM	Updates on student outreach office; stakeholder development (new partners). Washtenaw County update: CUOS/campus math tutoring, Pioneer High, Peace, Willow Run Kaiser, Ypsi Chapelle/ NSBE science club and math tutoring, 2 Ypsi Cobble Creek science clubs, Ypsi CCoG Opportunity Center science clubs. Oakland County: Pontiac Owen ES LC coordinator job description and model school LC plan. Susie now paid 1/2 UM and 1/2 Pontiac schools. Wayne County: Detroit Lessenger MS and search for community coordinator, Jeffries Project planning. Web update: tutor sites, lessons, wizards, career resources, training and camps.	23
2/6/97	Cobble Creek Learning Center, Ypsilanti	Charles Aileni hosted. Congresswoman Lynn Rivers spoke. Reviewed a summary of our first annual Coalition annual evaluation report! UM Student Outreach office has opened up, has target programs, plan for tutor recruitment, tech support projects, Alternative Spring Break program, DAPCEP program, Alicia presenting at WEPAN Conference. Updates from each county. Sneaker Tours with UM Community Outreach groups from Kalamazoo, Grand Rapids. New web homepage design. Discussion on money needs and fund-raising.	30
6/25/97	Detroit Edison, Detroit	<i>Wow! What those Moms can do!</i> Susie, Sherri, Doris shared what they are doing at Owen, George, and Pioneer. Deb McCartney shared <i>Reach Out!</i> and plans for campus-wide movement. Tim Vandekerckhove gave Detroit Edison tour. Martha gave Web-site and tech training news; 17 web workshops held for 256.	18
10/23/97	McMath-Hulbert Observatory, Pontiac	Update on science lessons and kits developed. Science clubs moving to mentoring model (same volunteers with same kids. Academic mentoring going well at Pioneer under Karyl: solid orientation, databases, teacher buy-in. Ypsi Chapelle and UM NSBE group working with 2 <sup>nd</sup> and 3 <sup>rd</sup> graders, with some transportation issues. Sandy Rosa shared Detroit programs; Nicole Yohalem Willow Run and Ypsi; Susie and friends gave in-depth presentation on Pontiac programs. We enjoyed tour of observatory.	21

Date	Where	Theme	Attendees
2/19/98	George ES LC Resource Rm., Ypsilanti	Sherrri Ahearn gave tour of LC room, overview of her job and how all is going. Aarti, Karyl, Cherita shared UM <i>Reach Out!</i> progress. Aarti and JL meeting with UM HOPE advisory to explore working together. We will help them with Web site and share our tutoring and career models. Working on 21 <sup>st</sup> Century Learning Community Centers program proposal.	25
10/22/98	Wayne County 4-H Extension Office, Detroit	Featuring 4-H friends from Wayne, Washtenaw, Oakland counties. Jeffries coordinators shared science clubs, parenting workshops and support, tutoring. We toured Jeffries Community Center after meeting. Minutes on line: <a href="http://www.eecs.umich.edu/mathscience/short-term/minutes_Oct98.html">www.eecs.umich.edu/mathscience/short-term/minutes_Oct98.html</a> .	29
1/28/00	AAPS Balas II Bldg., Ann Arbor	Feature: "Mentoring." Service Learning -mentoring for credit/ UM Psych class; Pioneer High Trailblazers; Elementary Peer mentoring - Susie's science and tech wizards; Community Mentoring - academic mentoring at Neutral Zone, Kiwanis Career mentoring at Slauson and Pioneer; <i>Reach Out!</i> UM undergrads —academic, career, science club mentoring. Minutes on line: <a href="http://www.eecs.umich.edu/mathscience/short-term/minutes_Jan00.html">www.eecs.umich.edu/mathscience/short-term/minutes_Jan00.html</a> .	40
10/13/01	Washtenaw County 4-H	Featuring our support for the national Afterschool Alliance program and the <i>Lights On Afterschool!</i> public awareness campaign in October, focusing on after-school academic and tech-related programs: <i>Reach Out!</i> Science Clubs, Pontiac Environmental Youth Task Forces, Family Learning Institute, MSU 4-H training available for clubs and community groups based on the Search Institute's "Asset Approach."	14

**Summary: 15 Coalition meetings at sites in Detroit, Pontiac, Ypsilanti, and Ann Arbor, with 325 attendees from five counties and out of state, representing higher education, K-12 education, community/parent groups, business, and government**

## B. Small-Group Meetings

Our databases (admittedly incomplete) show the following categories of meetings:

Purpose of Meeting	No. Meetings	No. Attendees
Program planning (including team meetings)	153	1127
Inservices (including mentor orientations)	66	998
Stakeholder development (including new partners)	110	1894
Volunteer recruiting meetings and events	23	1037
Presentations (usually to funding partners at program end)	10	911
	<b>362</b>	<b>5967</b>

## C. Personal Coaching

Our outreach staff has, over the years, provided extensive personal coaching to (and often created temporary Web sites for) people from dozens of groups in this and nearby communities who were beginning new initiatives with goals related to our own. They have included the Computer Challenge Clubs, the UM Health Occupations Partnership in Education, the Sisters of the Atonement in Detroit, Serendipity Reading Clubs, The Neutral Zone teen center, the Downtown Ann Arbor Kiwanis club, the Ford Rouge plant outreach planners, the North Maple Estates science club, an individual from GM who wants to start a mentoring program, the Washtenaw Mentoring Alliance, the YES Coalition, the Ypsilanti Schools Math-Science Academy planning group, Ann Arbor Bethel AME Church, Ypsilanti Community Church of God, Detroit World Outreach, two

Wayne State University K-12 outreach groups, Pontiac Boys & Girls Club, McMath-Hulbert Observatory, the City of Pontiac, Pontiac Schools, and—on campus—*Eta Kappa Nu*, Circle K, the PreMed Club, and the National Society of Black Engineers.

Additionally, we provided workshops for school and community folks from all over lower Michigan who were brought to campus for “Sneaker Tours” through the State Outreach program of the UM Office of Office of the Vice President for Government Relations. Director LaSovage made several trips to Grand Rapids and Kalamazoo to help some of them build their own coalitions and programs.

#### D. Specialized Services for Partners

Often, we attempt to fill needs for our partners that can seem like more work than they are worth, objectively speaking. However, we consider this an important aspect of building real partnerships; such services deepen our relationships and usually lead to joint programs that serve both our objectives. Here are some examples.

*Sneaker Tours.* The university’s Office of the Vice President for University Relations has offered what they call Sneaker Tours (meaning: wear your walking shoes!) for community folks from the outstate areas, busing groups of 15–20 around campus and apprising them of various UM academic outreach programs they may want to hook up with. At the request of the office’s Lew Morrissey, Jim Kosteva, Richard Carter, and Kristyna Meyer, we hosted groups half-a-dozen times in 1997–98, doing a Web workshop to show the kinds of things available on the Internet, using our own site as an example of how this technology can facilitate community coalitions. These groups included business and community folk, local government officials, foundation and higher education folk, school board trustees, teachers, and administrators from Bay City, Saginaw, Kalamazoo, Grand Rapids, and Battle Creek. Our K–12 Outreach Director traveled several times to these communities to help them to develop community coalitions like ours.

*Ann Arbor Fifth-Grade Campus Visit.* In spring 2001, our Elementary Program Coordinator Deb Hamann provided logistical support (somehow, that phrase does not capture the amount of work involved!) and set up a full day of activities for the entire fifth grade cohort from Ann Arbor’s Pattengill School. Our only relationship with the school had been that its new principal, Bob Galardi, had been Pioneer High’s principal when we began our mentoring program there. He had to get the children out of the school on the day all the other students spent with their prospective teachers for 2001–2002. Debbie called on many of the folks who provide activities all over campus for Camp Discovery in the summer, plus all the volunteers she could round up. We traipsed all over campus in a schedule so packed that at least one activity had to be omitted. The day was very successful and served as an entree to other connections with the school. In fall 2001 and winter 2002, we coordinated two lunch-time science clubs there and advised students on choosing and implementing science fair projects.

*Detroit Fifth-Grade Campus Visit.* When 90 fifth graders from Detroit’s Mann Learning Center came for a day-long visit, Deb helped to arrange a couple of hands-on science activities for them. CUOS scientist John Nees, with plenty of volunteer help, helped them to make lemon batteries, which were then connected into several large circuits. The children named their table groups and had fun competing for the highest voltage. In the process, they learned a bit about electrical circuits and about experimentation—as the winning group succeeded by kneading their lemons to release more juice from the pulp and so increasing conductivity. She also arranged for scientists we have partnered with before to provide another activity, augmented by volunteer help she recruited.

*K-grams Kids-Fair.* UM Circle K organizes an annual campus visit as the culmination of a year-long pen-pal program that pairs hundreds of UM students living in residence halls with elementary school children in Ann Arbor, Ypsilanti, and Detroit. The elementary school pen pals spend an entire day with their college buddies, participating in games, sports, and activities sponsored by over 100 student organizations. We have provided a hands-on science activity table every year for the program, and will be doing so again on March 22, 2002.

*Workshops for Incoming UM Freshmen.* September 2001 was the first time UM offered such workshops. Reach Out! was the only group that provided sessions for all four time periods:

1. College—A Fresh Start and Some Cautions
2. Get the Grades You Want Without Surrendering a Social Life
3. Catch the Community Service Spirit
4. What Turns You On?

The content for these all came from Karyl Shand's work with the teen academic mentoring program and with Kiwanis career mentors, which shows how what we learn and do with teens is very often applicable to our UM students. Our new coordinators also stepped right up to present these workshops, since the students who prepared them in the spring had all graduated! This demonstrates how well our training and coaching model works—allowing a passing of the baton to the next generation of leaders. It exemplifies the selfless teamwork we engender, and the way our flexibility allows us to build upon individual and collective assets.

*Web Pages.* We often provide a temporary Web presence within our own site for our partners, until they can manage their own Web sites. We created and managed, for a time, the original Web pages for Serendipity Reading Clubs, the UM Health Occupations Partnership in Education, The Neutral Zone teen center, and the Downtown Ann Arbor Kiwanis club. The latest group for which we have provided this service is the Washtenaw Mentoring Alliance: [www.eecs.umich.edu/mathscience/wma/index.html](http://www.eecs.umich.edu/mathscience/wma/index.html).

## Appendix E. Photo Gallery: A Representative Sample of Who We Are



**Debra McCartney Hamann**

*Reach Out! Founder, UM College of Engineering Graduate, UM CUOS Program Coordinator*

Number of Programs:	34
Number Served:	815
Number of Volunteers:	368
Number of Partners:	85

[www.eecs.umich.edu/mathscience/reachout/Who/deb.html](http://www.eecs.umich.edu/mathscience/reachout/Who/deb.html)  
[www.eecs.umich.edu/mathscience/discovery/99camp1.html](http://www.eecs.umich.edu/mathscience/discovery/99camp1.html)  
[www.eecs.umich.edu/mathscience/discovery/camp2000/2000camp1.html](http://www.eecs.umich.edu/mathscience/discovery/camp2000/2000camp1.html)  
[www.eecs.umich.edu/mathscience/scienceclubs/clubs.html](http://www.eecs.umich.edu/mathscience/scienceclubs/clubs.html)  
[www.eecs.umich.edu/mathscience/scienceclubs/annarbor.html](http://www.eecs.umich.edu/mathscience/scienceclubs/annarbor.html)  
[www.eecs.umich.edu/mathscience/scienceclubs/ypsi.html](http://www.eecs.umich.edu/mathscience/scienceclubs/ypsi.html)  
[www.eecs.umich.edu/mathscience/scienceclubs/annarbor.html](http://www.eecs.umich.edu/mathscience/scienceclubs/annarbor.html)

### Programs & Roles

Coordinator, Summer Science in the Parks, 1997, 1998  
Coordinator, Peace Neighborhood Ctr. Science Club, Fall 1997, Winter 1998, Fall 1998, Winter 1999  
Research Experiences for Teachers 1999  
Overall Coordinator, Elementary Science Clubs, Fall 2000, Winter 2001, Fall 2001  
Coordinator, Bryant Science Clubs, Fall 1999, Winter 2000, Fall 2000, Winter 2001, Fall 2001  
Presenter, HealthFOCUS (Health For Our Children in Urban Settings) Conference, 2000, Detroit  
Organizer, all-day field trip activities for Detroit's Mann Learning Center, Spring 2001  
Coordinator, Pattengill Campus Day, Spring 2001  
Planner and Teacher, Summer Algebra, 2001  
Coordinator, Camp Discovery, 1999, 2000, 2001



**Karyl Shand**

*Reach Out! Founder, UM College of Engineering Graduate, Instructor, Sylvan Learning System*

Number of Programs:	23
Number Served:	583
Number of Volunteers:	563
Number of Partners:	30

[www.eecs.umich.edu/mathscience/reachout/Who/karyl.html](http://www.eecs.umich.edu/mathscience/reachout/Who/karyl.html)  
[www.eecs.umich.edu/mathscience/exploringsci/careerclubs.html](http://www.eecs.umich.edu/mathscience/exploringsci/careerclubs.html)  
[www.eecs.umich.edu/mathscience/reachout/PHSguide.html](http://www.eecs.umich.edu/mathscience/reachout/PHSguide.html)

### Programs & Roles

Volunteer Mentor, Pioneer High, Fall 1996–Fall 2000  
Coordinator, Pioneer High Mentoring, Fall 1996, Winter 1997, Spring 1997, Fall 1997, Winter 1998, Spring 1998, Fall 1998, Winter 1999, Spring 1999, Summer 1999, Fall 1999, Winter 2000, Spring 2000, Summer 2000, Fall 2000  
Teacher, Summer Chemistry, 1999  
Developer, Academic and Career Mentor Orientations  
Developer and Coordinator, Personal Discovery Workshops, 2000



### **Doris Calvert**

*Ann Arbor mother, businesswoman, social worker,  
& community leader*

Number of Programs:	23
Number Served:	626
Number of Volunteers:	447
Number of Partners:	37

[www.eecs.umich.edu/mathscience/learningcommunities/george/00garden.html](http://www.eecs.umich.edu/mathscience/learningcommunities/george/00garden.html)  
[www.eecs.umich.edu/mathscience/reachout/PHSguide.html](http://www.eecs.umich.edu/mathscience/reachout/PHSguide.html)  
[www.eecs.umich.edu/mathscience/scienceclubs/ypsi.html](http://www.eecs.umich.edu/mathscience/scienceclubs/ypsi.html)

#### **Programs & Roles**

Volunteer Mentoring Coordinator, Pioneer High School, Fall 1996, Winter 1997  
 Mentoring Coordinator, Pioneer High School, Fall 1997, Winter 1998  
 Site Coordinator, Community Church of God Science Clubs Science Clubs, Winter 1999, Fall, 1999, Ypsilanti  
 Research Experiences for Teachers 1999 Coordinator, George School Courtyard Garden Club, Spring, 2000, Ypsilanti  
 Coordinator, George School Community Resource Room and Science Wizards, Fall, 2000, Winter 2001, Ypsilanti  
 Organizer, Career CONNECT fair, The Neutral Zone, Spring 2001  
 Community Developer, Ann Arbor



### **Susan Shoemaker**

*Pontiac Learning Community Coordinator,  
Pontiac City Councilwoman*

Number of Programs:	17
Number Served:	1291
Number of Volunteers:	100
Number of Partners:	83

[www.pontiac.mi.us/cityhall/council/councilshoemaker.htm](http://www.pontiac.mi.us/cityhall/council/councilshoemaker.htm)  
[www.eecs.umich.edu/mathscience/YTF/ytf.html](http://www.eecs.umich.edu/mathscience/YTF/ytf.html)  
[www.eecs.umich.edu/mathscience/PPS/owenhome.html](http://www.eecs.umich.edu/mathscience/PPS/owenhome.html)  
[www.eecs.umich.edu/mathscience/PPS/room.html](http://www.eecs.umich.edu/mathscience/PPS/room.html)  
[www.eecs.umich.edu/mathscience/wizard.html](http://www.eecs.umich.edu/mathscience/wizard.html)  
[www.eecs.umich.edu/mathscience/exploringsci/careerclubs.html](http://www.eecs.umich.edu/mathscience/exploringsci/careerclubs.html)

#### **Programs & Roles** (only since fall 1995)

Pontiac Community Coordinator  
 Co-Coordinator, Road Scholars Program with GM, Fall 2001  
 Coordinator, Youth Task Force on the Environment, Winter 2001  
 Owen School Learning Community Coordinator  
 Owen Science & Tech Wizards  
 Owen Career Clubs  
 Bill Nye the Science Guy  
 Research Experiences for Teachers 1999  
 Owen Community Resource Room Coordination  
 Owen Lunch-Hour Science Club  
 Owen After-School Science Club  
 Owen Balloon Launch Club  
 Owen Rocket-Building Club  
 Owen Theme Weeks/Intersessions  
 Career Exploration Resource Recruiting



### **Aarti Raheja**

*Reach Out! Founder, UM LS&A Graduate,  
3rd-year medical student at Wayne State  
University*

Number of Programs: 9  
Number Served: 470  
Number of Volunteers: 236  
Number of Partners: 56

[www.eecs.umich.edu/mathscience/reachout/Who/aarti.html](http://www.eecs.umich.edu/mathscience/reachout/Who/aarti.html)  
[www.eecs.umich.edu/mathscience/discovery/99camp1.html](http://www.eecs.umich.edu/mathscience/discovery/99camp1.html)  
[www.eecs.umich.edu/mathscience/discovery/camp2000/2000camp1.html](http://www.eecs.umich.edu/mathscience/discovery/camp2000/2000camp1.html)  
[www.eecs.umich.edu/mathscience/scienceclubs/annarbor.html](http://www.eecs.umich.edu/mathscience/scienceclubs/annarbor.html)  
[www.eecs.umich.edu/mathscience/scienceclubs/ypsi.html](http://www.eecs.umich.edu/mathscience/scienceclubs/ypsi.html)

#### **Programs & Roles**

Volunteer Mentor, Pioneer High School, Spring 1996  
Organizer, Science Day at Cobble Creek, 1996,  
Ypsilanti  
Volunteer Science Clubs, Fall 1997, Winter 1998,  
Community Church of God, Ypsilanti  
Coordinator, Summer Science in the Parks, 1998  
Coordinator, George School Science Clubs, Fall  
1998, Winter 1999, Ypsilanti  
Research Experiences for Teachers 1999  
Coordinator, Camp Discovery 1999, 2000, 2001  
Dissecting Tools Donation, 2000, Detroit  
HealthFOCUS (Health For Our Children in Urban  
Settings) Conference, 2000, 2001, Detroit  
Medical Career Presenter Recruiter



### **Ben Kaufman**

*UM College of Engineering Graduate,  
General Motors Engineer*

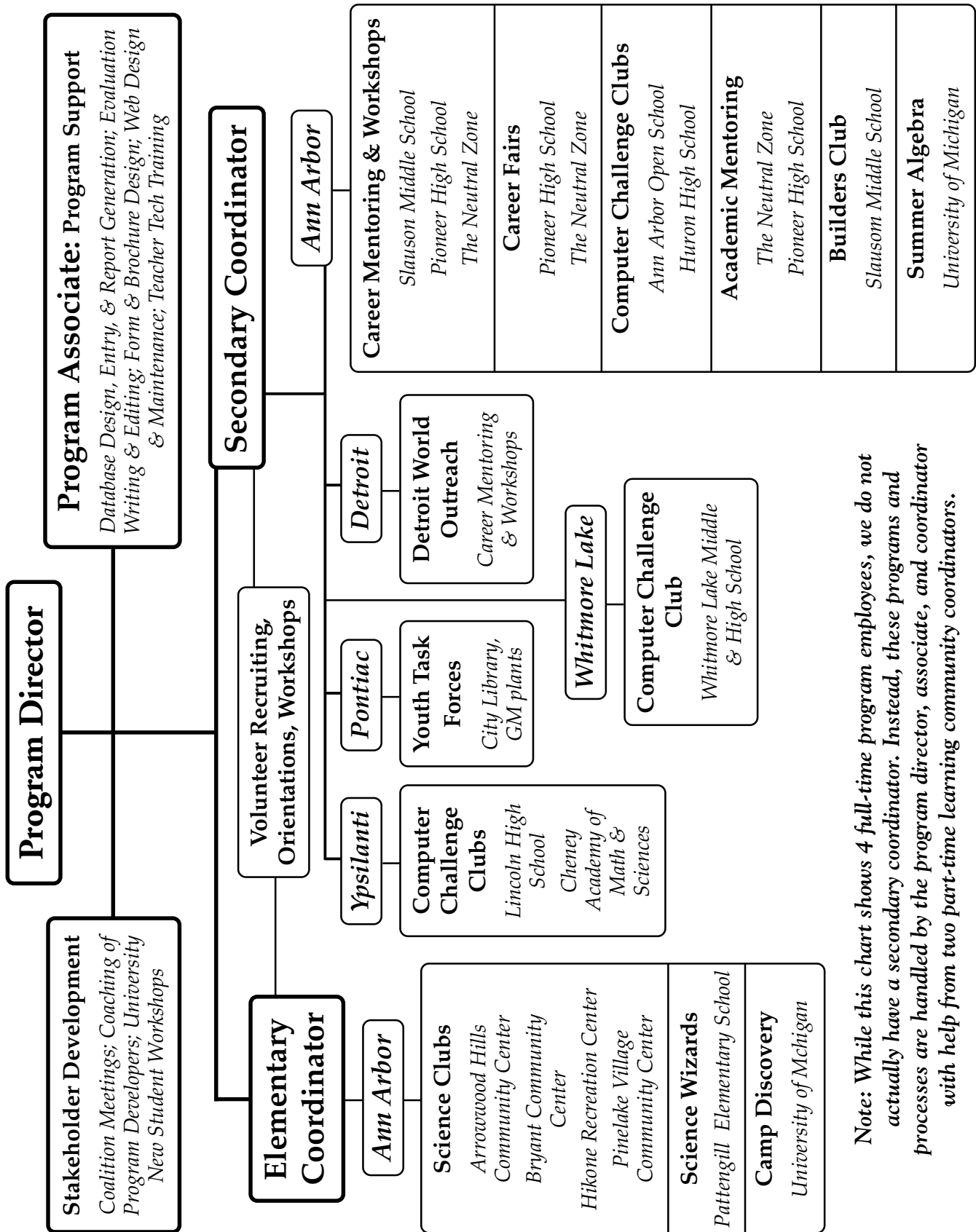
Number of Programs: 5  
Number Served: 98  
Number of Volunteers: 44  
Number of Partners: 13

[www.eecs.umich.edu/mathscience/reachout/Who/ben.html](http://www.eecs.umich.edu/mathscience/reachout/Who/ben.html)  
[www.eecs.umich.edu/mathscience/scienceclubs/annarbor.html](http://www.eecs.umich.edu/mathscience/scienceclubs/annarbor.html)  
[www.eecs.umich.edu/mathscience/scienceclubs/ypsi.html](http://www.eecs.umich.edu/mathscience/scienceclubs/ypsi.html)

#### **Programs & Roles**

Volunteer, Fall 1998 and Winter 1999, George  
School Science Clubs  
Coordinator, Fall 1999 Bryant Science Club  
Coordinator, Winter 2000 Hikone Science Club  
Coordinator, Fall 2000 Hikone Science Club

# Appendix F. Organizational Chart



*Note: While this chart shows 4 full-time program employees, we do not actually have a secondary coordinator. Instead, these programs and processes are handled by the program director, associate, and coordinator with help from two part-time learning community coordinators.*

## **We've run out of time!**

We had, of course, planned to update the following lists, which we think impart better than most data just how real and broad-based our partnerships have been. Having spent months on writing proposals and searching for new sponsorship after the end of the CUOS STC, however, we have not yet been able to do so.

We are officially laid off March 21, 2002, although e-mail and voice mail will continue for an indeterminate span of time. The *Reach Out!* student organization will continue at UM. Those of us who have been outreach employees will continue to help run programs through the end of the semester or school year, as appropriate, working from our homes.

We still hope to update our Web site—including these lists. If/when these generous accommodations by the university must end, please look for us at [www.reachoutmichigan.org/](http://www.reachoutmichigan.org/) and contact us at [reachout@comcast.net](mailto:reachout@comcast.net).

### **Appendix G. Coalition Partners List**

We will update what's on line at

[www.eecs.umich.edu/mathscience/report99/app2.html](http://www.eecs.umich.edu/mathscience/report99/app2.html)

although probably with a new filename linked from the home page.

### **Appendix H. Volunteers List**

Will update what's on line at

[www.eecs.umich.edu/mathscience/reachout/vols\\_A-L.html](http://www.eecs.umich.edu/mathscience/reachout/vols_A-L.html) and [../vols\\_M-Z.html](http://www.eecs.umich.edu/mathscience/reachout/vols_M-Z.html)