Report of the Pre-College Outreach Task Force

Strategic Plan: WPI and its Relationship to the K-12 Educational Community
March 6, 1997
Michael Burzycki, ME '98
Bill Grogan, Dean Emeritus, Undergraduate Studies
Denise Nicoletti, Associate Professor, Electrical and Computer Engineering
Gale Nigrosh, Development Specialist for Higher Education & Business Partnerships, Worcester Public Schools
Lance Schachterle, Assistant Provost

1. Formation and Makeup of Task Force
John Heyl (Vice President, University Relations), met with the initial members of the task force: Bill Grogan (Dean Emeritus, Undergraduate Studies), Denise Nicoletti (Associate Professor, Electrical and Computer Engineering), and Gale Nigrosh (Development Specialist for Higher Education & Business Partnerships, Worcester Public Schools). The final makeup was the first order of business. Since Leah Vetter has recently stepped down as principal of the MassAcademy, she was not able to serve. An undergraduate representative was found (Michael Burzycki, ME '98). Lance Schachterle (Assistant Provost) later joined the task force. Jeremy Olszewski served as our liaison to the steering committee. Denise Nicoletti agreed to serve as secretary.

2. Review of Task Force Meetings
Copies of our meeting's minutes are attached in Appendix A. Notes of meeting between Denise Nicoletti and Blanche Pringle, Director of the Minority Affairs and Outreach Programs Office (MAO) are given in Appendix B; a meeting between Blanche and the entire task force was not possible due to scheduling conflicts.

3. Feedback
Appendix C contains copies of email messages sent by representatives of different segments of our community to our Task Force, including faculty and staff. A report on a meeting with student representatives is given in the minutes of the February 18, 1997 meeting in Appendix A.
4. Comments Made at the Open Meeting
Below is a listing of comments made at our task force's open meeting.

- outreach is a matter of survival
- the program should be for a broader target audience than the Worcester Public Schools (WPS)
- freshmen year could be improved
- there could be a program for HS teachers as visiting scholars at WPI
- Frontiers/Strive could be expanded to include teacher training
- WPI could become active in teacher training for new teachers
- there is an overlap between this task force and the admissions task force, in particular raising the quality of students and the percentage of minority students.
- WPI faculty efforts should be viewed as scholarship; resources should be made available, and appropriate assessments made
- block scheduling has been introduced in public schools, allowing for the possibility of interdisciplinary efforts as the teachers become facilitators

5. Our Findings

**Why WPI Should Be Involved With Outreach**
There is a compelling case to be made for WPI’s involvement with the pre-college community. Essentially, it is a fundamental responsibility for WPI faculty and administration as professional educators and as citizens to contribute where we can do so appropriately in the process of K-12 education. There is always a need for new ideas in delivery systems, integration of technology, and the updating of content, as well as the more intangible inspiration and guidance we could provide. We are reminded annually of just how dependent we are upon the pre-college community for the preparation of our incoming students, and for the attitudes they hold about science and technology that may lead to their consideration of our type of education in the first place. It is in the self-interest of our university and our profession that we at WPI become actively involved in pre-college education.
WPI has a special reason why it is important to be an active contributor within the Worcester community since we have a position of privilege in that we hold tax exempt status with that community -- a status that implies that we are expected to be active contributors to that community. That status is becoming the target of increasingly serious attacks in the form of requests that we make "payments in lieu of taxes." It is extremely important that WPI position itself to defend itself against those attacks. No single activity can better demonstrate our contribution to the community than through cooperative efforts with the local school system.

Internally, while certainly not everyone at WPI is interested in participating in programs at the pre-college level, there are a number of faculty who do have professional interests beyond their customary disciplinary affiliations, and would welcome encouragement and support for participation in a variety of educational, outreach and diversity programs.

Not only universities but professional organizations such as the IEEE have now established working programs at the pre-college level. WPI should do no less.

**II. Caveats**

While the needs and opportunities for WPI/pre-college cooperation are plentiful, there are issues that must be dealt with cautiously.

WPI should never forget that its primary obligation is to its own students, its internal programs, and the professional development of its faculty. Increasing faculty load through expanded external activities without the developing additional resources and incentives is untenable.

WPI should not promise more than we can or should try to deliver. Outreach is about enhancing the image of WPI and spreading our vision of the future. Failed programs would have only negative effects on these efforts.

History has shown us that strong links must be developed with knowledgeable individuals within the pre-college community. Above all, WPI should never participate in programs or present its ideas with any trace of a condescension or
superiority. Even the term "outreach" has been criticized. Only cooperation developed through mutual respect will succeed.

III. Math and Science Programs in the Worcester Public Schools

The 1993 Massachusetts Education Reform Act mandated the establishment of a common core of learning. The Commonwealth created curriculum frameworks in Math and Science & Technology. Following this, the Worcester School Committee approved curricula for WPS in these two areas. Aspects of this new curricula include all students study algebra and an integrated science approach.

In parallel to our exploration of WPI's distance learning capabilities, we learned that WPS has just purchased a PictureTel system for South High School. This acquisition along with others in different school systems shows that public schools are prepared to be partners in distance learning programs from the technological side.

Other insights learned were that WPS teachers say that their greatest needs are for assistance in creating interdisciplinary, thematic units and programs about technology. Also, IQPs should respond to real needs of schools, not simply the need for IQP topics.

IV. Specific Recommendations

We suggest that WPI move forward with the following efforts:

- Inventory and coordinate its own assets:
  We learned that WPI already expends resources and time on outreach. These undertakings include:
  - Educational and other IQP's, particularly on-campus projects
  - Summer outreach programs: Camp Reach, EMSEP [Excellence in Math and Science and Engineering Program], Frontiers, and Strive
  - Student groups' activities (SHPE and NSBE to name two)
  - Math program for teachers
  - Distant learning capabilities
  - Master of Natural Science alumni program
  - Broad range of other outreach programs: "Kids To College," "Hoop Dreams," Forest Grove Middle School, NSSFNS college fairs, campus overnight visitation
program for prospective freshmen who are students of color, annual reception in Puerto Rico
Various programs headed by individual faculty and staff members

While this list is not comprehensive, it does show that a better outreach program is not so much a matter of shifting resources from another area to outreach -- it is a matter of better focussing and coordinating efforts already taking place. Another benefit from an extensive inventory is coordination of efforts to remove obstacles to current outreach programs. Examples include: 1) the one obstacle to the efforts of SHPE and NSBE was reported to be transportation -- getting WPI and K-12 students to and from the WPI campus; 2) the Strive program was forced to eliminate its research component.

- Focus these efforts to highlight WPI's strengths
  Outreach programs could draw upon and advertise our global program, interdisciplinary projects, technologically-based liberal education, etc.

- Develop cooperative relationships with appropriate individuals in the pre-college systems
  These relationships have been strong in the past. They need to be rekindled -- particularly if we want to remain competitive in our own geographical region.

- Use the on-campus IQP in a more cohesive manner to implement focused programs
  Recent reviews of the IQP have shed light on problems with quality, and many see these problems more prevalent in on-campus IQPs on education. Raising the standards and providing a cohesive programs with its inherent support system will make these projects better experiences for the students, advisors, and WPS sponsors, as well as help meet our overall goal of outreach.

- Use the off-campus IQP as an outreach mechanism
  For example, outreach to third world countries such as Jamaica, Mexico, Latin America, and Haiti, the Dominican Republic, South Africa, and other parts of Africa and the Caribbean.

- Consider programs that concentrate on teacher development in internet techniques, course and laboratory enhancement, and develop sources of external funding such as NSF
  Recent news from Washington, D.C. indicates that there will be funding available for the introduction of technology into our public education
systems. WPI is well-suited to be part of this effort, but the time to act is now. This also could be seen as a developmental program for making more minority students competitive.

Appendix A: Minutes of the Pre-College Outreach Task Force

January 15, 1997

Present: Bill Grogan (Dean Emeritus, Undergraduate Studies), John Heyl (Vice President, University Relations), Denise Nicoletti (Assistant Professor, Electrical and Computer Engineering), Gale Nigrosh (Development Specialist for Higher Education & Business Partnerships, Worcester Public Schools)

The final makeup of the committee was discussed. Since Leah Vetter has recently stepped down as principal of the MassAcademy, she may or may not be able to serve. Alternatives were suggested, and Bill Grogan will be looking into this. An undergraduate representative is also needed, and Denise Nicoletti will find one.

John Heyl reviewed the charge of the committee. It is suggested that we hold an open forum for the community soon, which can be arranged for through the Provost's secretary.

Copies of emails regarding the strategic planning efforts were distributed.

Various topics were discussed as possible vehicles for outreach, including but not limited to (and listed below with no implied priority):

1) using WPI's experience with distance learning by bringing lectures or other material to pre-college schools across the country. Also, distance learning versus bringing pre-college students on campus.

2) Teaching teachers about our mission versus teaching pre-college students.

3) The history of and building better community relationships between WPI and Worcester.

4) Engineering education to pre-college teachers or students.

5) The history and future prospects of using the IQP program.

It was decided that we should look into the distance learning resources at WPI, and the next meeting will be arranged between our committee and Pennie Turgeon, Director of the WPI IMC (Instructional Media Center).

Committee members should also review the Steering Committee's 'Focus Questions', and be prepared to discuss them.

Denise Nicoletti agreed to serve as secretary for this committee.
January 21, 1997

Present: Bill Grogan (Dean Emeritus, Undergraduate Studies), Denise Nicoletti (Assistant Professor, Electrical and Computer Engineering), Gale Nigrosh (Development Specialist for Higher Education & Business Partnerships, Worcester Public Schools), Michael Burzycki, undergraduate representative (for the first part of the meeting), and a guest: Pennie Turgeon, Director of the WPI Instructional Media Center

This meeting was held to learn the facilities of the Instructional Media Center (IMC), and what other facilities might be available for distance learning. This committee is interested in investigating the use of distance learning for K-12 students.

Pennie's general comments were that 'canned' courses alone have already been done and to a high enough quality that WPI should not pursue this route. She also explained the following systems:

**VIDEOTAPE:** WPI currently has good production facilities.

**VIDEOCONFERENCING OVER PHONE LINES (PICTURETEL):** 2-way compressed audio/video over phone lines. WPI has a system now, and have used it for distance learning, WPI alumni in California talking with students in Bangkok, etc. Both the sender and receiver of the signal needs compatible systems. There are systems compatible with WPI's at some high schools now. You can purchase desktop varieties (i.e. boardsets in your PC) for about $3000. It would cost about $20k for a bare bones group system, and Picturetel might be interested in making donations to public schools. Also, nonprofit organizations can arrange for a $90/month flat phone line charge.

**VIDEOCONFERENCING OVER THE INTERNET:** lower quality that Picturetel. One such system is CUSeeMe from Cornell.

**CABLE:** We could transmit through Greater Media Cable (GMC), but WPI is not currently hooked up. This technology would reach only the audience that is served by one particular cable company. Gale reported that Clark is currently working on a system with the Worcester Public Schools. It was conjectured that it might be possible to get a WPI hookup using MassAcademy's role as a public school. GMC maintains a parallel network (to their subscriber network) called the I-NET (I-NET = institutional network). The I-NET is the system used for town meetings.

**MICROWAVE:** There is a possibility of obtaining microwave capability through an agreement with Emerson College, which would allow for the generation of signals to the Boston area. This would reach only those with microwave dishes, and transmission would be limited to the locations east of Worcester.

**SATELLITE:** This requires a truck (from MCET, for example) for satellite uplink, at $1.5k/day. This truck uplink is generally for one-shot events, not courses. The costs of installing a permanent
uplink is around $1/2 million.

Then, the discussion turned to more general topics. Oklahoma State University has AP course broadcasts to high schools, using an identified local teacher. This is an example of the use of enhancement. Another possible avenue for WPI is using interdisciplinary strengths, for which there is a need in K-12 education. WPI's prestige would carry weight with school districts, we could help Worcester, and our efforts might be attractive to funding agencies. Using the city of Worcester as a test bed seems ideal.

It was left that the technology is there -- we need to set our goals, and then fit the distance learning system to those goals.

We intend to invite Lance Schachterle to our next meeting. Leah Vetter will not be able to be part of our committee work, as she as stepped down as the principal of the MassAcademy.

February 7, 1997

Present: Denise Nicoletti (Assistant Professor, Electrical and Computer Engineering), Gale Nigrosh (Development Specialist for Higher Education & Business Partnerships, Worcester Public Schools), Jeremy Olszewski (undergraduate & liaison to steering committee), Lance Schachterle (Assistant Provost).

We approved minutes for last meeting, January 21 1997.

We approved email to WPI faculty, staff and students announcing of the committee's charge and makeup. Denise will send out this email.

We determined that the next few meetings will be: a meeting with Blanche Pringle during the week of February 17 (to be scheduled by Denise), and an open meeting during the week of February 24 (to be scheduled by Lance through the Provost's office).

The progress of the committee was reviewed for Lance, who just joined the committee.

Gale made several announcements, including:

- a listing of the AP courses offered at Worcester Public Schools (WPS), showing that none of them offer AP Physics.

- Hudson, MA has a 'virtual high school' -- Gale is looking into what that actually means.

- Gale found out that WPS is purchasing videoconferencing equipment for South High. The contact person there is Frank Walsh, WPS Media Liaison at South High, 799-3333. They are looking for opportunities, and are presently holding discussions with UMass Amherst.

- Gale reviewed the DNA project at Doherty, a project that is the
Denise discussed her viewpoint that outreach efforts need to highlight and be coordinated with WPI's unique and outstanding programs, including interdisciplinary projects, global opportunities, etc. Rather than duplicate efforts at other schools (who have been at this game for some time), we should play up our strong points. Gale pointed out that the global program might be linked to Gates Lane school (K-6), whose focus is "international studies" -- principal is Betti Carr. Lance brought up the current, experimental WWW-based programming section being currently offered at WPI. This section is for MassAcademy, and Admissions is interested in it as a recruitment vehicle.

The discussion turned to the need to build incentives and rewards for WPI members and the K-12 schools in order for any program to succeed. Also, programs need to be built on a team approach -- cooperation between WPI and specific teachers in the schools.

February 18, 1997

Present: Michael Burzycki, undergraduate representative, Bill Grogan (Dean Emeritus, Undergraduate Studies), Denise Nicoletti (Assistant Professor, Electrical and Computer Engineering), Gale Nigrosh (Development Specialist for Higher Education & Business Partnerships, Worcester Public Schools), Lance Schachterle, Associate Provost

Minutes from 2/7/97 meeting were approved.

The rest of the meeting revolved around setting the agenda for the open meeting, scheduled for Wednesday, February 26, 3pm, Kinnicutt Hall. Denise will make a draft of the transparencies that we will use for the meeting. Gale reported that Worcester Public Schools seem most interested in interdisciplinary topics, not AP course offerings. Mike discussed the on-campus IQP (his IQP is on-campus), and contrasted sponsored versus not sponsored projects, and whether students are working towards learning the process of the IQP or working towards a solution of a real problem.

Denise briefly reported on her meeting with representatives from the Society of Hispanic Professional Engineers (SHPE) and the National Society of Black Engineers (NSBE). Her notes from this meeting are given in Appendix A.

The meeting was then adjourned.

APPENDIX A: Notes from meeting between Denise Nicoletti, Jose Martinez, student member of the Society of Hispanic Professional Engineers (SHPE), and Tamara Samuels, student member of the National Society of Black Engineers (NSBE).

SHPE activities: At Chandler magnet school, WPI SHPE students do bilingual tutoring in math for 6th graders, and sponsor visits by these students to campers. These activities allow them to serve as
role models. SHPE students also tutor high school students in the John Laws Institute. This institute gives its members free tuition to Worcester consortium schools if they complete the program. SHPE students also do college orientation programming for the John Laws Institute students.

NSBE activities: WPI NSBE students also tutor John Laws Institute students. They are developing a NSBE Junior chapter at Doherty High School, whose activities will include a one-day workshop on job opportunities, scholarships, and apprenticeships. NSBE brings speakers to WPI for the high school students through alumni NSBE. Next year, they plan to help at Tatnuck Elementary with science classes, and at Elm School with a role model program.

SHPE works with Prof. Rivera and an Advisory Board; NSBE works with Yvonne Harris of the Career Development Center.

The one obstacle to their efforts was reported to be transportation -- getting WPI and K-12 students to and from the WPI campus.

Appendix B: Meeting with Director of the MAO

Below are notes of a meeting between Denise Nicoletti and Blanche Pringle, Director of the Minority Affairs and Outreach Programs Office (MAO); a meeting between Blanche and the entire task force was not possible due to scheduling conflicts.

Blanche Pringle sees two major reasons for outreach: 1) to demonstrate that WPI is made up of good citizens, interested in education and service beyond our own campus; 2) to get students into our pipeline at the earliest stage. This distinction underscores the difference between outreach (reason 1) versus yield (reason 2) activities.

Activities and programs that the MAO is currently involved with include:

- summer experiences, listed below with last year's enrollment numbers:
  - Camp Reach (Starting this summer)
  - Frontiers (89)
  - Strive (11)
  - EMSEP [Excellence in Math and Science and Engineering Program] (23)

- Kids To College: as part of a program with Worcester Public Libraries and the Worcester Consortium, WPI adopted a 6th grade class and has six activities with those students, both at their school and on campus.

- Hoop Dreams: 100 kids from Worcester are brought on campus for a three-day event

- Forest Grove Middle School: part of the Worcester Consortium's program to have representatives meet with 8th graders
- NSSFNS college fairs and the New Haven middleschool visitation program and annual luncheon with talented high school students.

- Umoja/Unidad a campus overnight visitation program for prospective freshmen who are students of color sponsoring during the admission's Closer Look Program. This program was very successful last year: fourteen of the fifteen students who attended Umoja/Unidad enrolled at WPI.

- other visits to schools, bringing groups on campus, etc.

Other outreach programs:
Annual reception in Puerto Rico. WPI students, faculty and staff interact with accepted students, parents, counselors and IQP project sponsors.

When asked about where WPI might want to go in the future, Blanche had several comments:

- all of the programs now underway can be expanded -- but only with administrative support. For example, Strive started out with a $160k over 5 year grant from UTC which is down to $25k/year, requiring WPI to eliminate the research component of the program and reduce the numbers of participants.

- resources should be allocated to a variety of outreach and yield activities, such as bringing students (prospective and pre-college) on campus, diversity programs (speakers, colloquia), and funds to allow WPI faculty, staff and students to show our presence at community events.

- Worcester Public Schools needs developmental programs to make its minority students competitive; Distance learning techniques could be used for these programs.

IQP projects should be developed in urban and rural areas as well as in third world countries that need exposure to technology and or projects that can help their community. (Atlanta, DC, Los Angeles, Chicago, NY, New Mexico, American Indian reservations, New Orleans)

- Outreach to third world countries such as Jamaica, Mexico, Latin America, and Haiti, the Dominican Republic, South Africa, and other parts of Africa and the Caribbean.

This effort might be part of move to develop project centers that are culturally relevant to our hopefully increasingly diverse student and faculty population. These project centers also provide a cultural emerson for non-minority students. We could also develop a cultural exchange between CRGEM (Puerto Rico) and the Mass Academy.

- Get the whole pipeline of people involved: elementary, middle and high school students, undergraduate, graduate, and professional students.
- create scholarships for students and faculty to be involved with these outreach and diversity activities. Visiting professor programs and exchange programs with public school teachers and WPI faculty.

Appendix C: Email Feedback From Community

Below are copies of email messages sent by representatives of different segments of our community to our Task Force.

Prof. Angel A. Rivera:

I am not sure if this comment is pertinent to your group, but I know that the Society of Hispanic Professional Engineers have been working with Worcester's schools for the past two years. They have been able to develop two programs. One with the John Las Tutoring Program, and the other one with the bilingual program at Chandler Magnet School. I also understand that NSBE has outreach programs. Both organizations have been trying to combine their efforts.

If this is of interest to the task force, or if you think that these two organizations can participate, please let me know. I am the current advisor of the Society of Hispanic Professional Engineers.

John A Goulet:

The only comment I would make is that the Master's in Math Education program also, in part, provides a similar service in the mathematics area. Almost all students in it are K-12 teachers, and in going thru the program get a healthy does of the WPI philosophy of education, use of projects and teams, and the impact of technology. I work in this program; if I can provide any help, feel free to let me know.

Denise Rodino:

I have some concerns about funding pre-college outreach-ones you've heard in person already. (Not, I repeat, not a personal valuation of outreach programs which I believe are critical!!!):

Outreach programs are very expensive. (Can we design some which carry few expenses?)

WPI student's tuition cannot/should not fund outreach programs (should they?).

Potential corporate donors to outreach programs exist; unfortunately, those potential donors and the university's current donors are usually one and the same. Thus, while corporate support is possible for outreach programs, it can come at the cost of grants to the university (not a pleasant thought!).

Seed-funding of outreach programs is more possible than operational funding.

Finding operational funding for outreach programs (e.g., Strive) has
proved difficult at best, particularly when we attempt to reach new audiences rather than going back to current donors.

Don't mean to be pessimistic, but these are real issues that must be addressed as we expand our outreach. I'd be happy to discuss in greater detail, and suggest that as you explore leadership in K-12 outreach you do not ignore the funding issues.

Wish you well in this.

Kevin Morris, Head Coach of Football:

The WPI football program would certainly be interested in assisting the program. We have had players read to classrooms and appear at college days in the Worcester schools. Please contact me regarding the specifics of your program as you develop it.

Robert W Thompson:

The charge sounds like a foregone conclusion. I would much rather see the task force first ask the question - is K-12 something we should be in business for?

My personal feeling is that this task force should not even exist, and rather than moving the faculty to increasingly lower intellectual levels, we as a Faculty (at what is now being called a UNIVERSITY) should strive to increase the intellectual atmosphere on this campus.

Will you be having an open meeting to present your thoughts, or have we already made commitments to the Worcester Public School System?

Patrick P. Dunn:

I am currently mediating an effort to establish Internet exchanges between the Center for Information/Education in Worcester's Sister City, Pushkin, Russia, and Arnold Pulda at Doherty H.S. and Bette Carr at Gates Lane School.

I think that such pairings of classrooms on an international level, along the lines of those developed by Project Harmony, are a great possibility for WPI, given our strength in ECE.

John M Wilkes:

My relationship to the public schools should be well known to Gale Nigrosh, but I do certainly have some idea about how the educational ipg projects area should be reorganized into a project center and how we should be supporting teachers interested in using the results of past projects by mobilizing an alumni network to be created in the STEM model developed in Troy NY by Beverly Swartz. One of her people will be here at the NASTS conference. We also have to discuss how to
work along with the compacting idea and with the student teachers from other colleges to improve the interface between the Worcester colleges and the public schools.

I really like Gale, but be aware that I also have a network and research agenda that goes far beyond Worcester alone but we have never coordinated the contacts of many faculty with different school districts. That too should be done. Ultimately I think we will need a half-WPI half-public schools coordinating committee to annually review the yield of a year's worth of work and propose the next generation of projects, working out the distribution of projects in the schools as well. There will be data archiving requirements and evaluation research procedures to work out as well.

I think it would be important to have all the members of your committee come to at least part of the upcoming NASTS meeting which will showcase our recent educational projects program. It will be held during the upcoming term break. Do you have a copy of the program? How many would you need for the committee? Bill Grogan is on the program so he should have been sent one already, and if not I will take care of the two of you right away.

George D. Phillies:

I read the goal that your Task Force has been given. To become a national leader in K-12 education, assuming we mean what we say, we would need a serious quality education program. Now, some excellent departments are small. For example, for many years top-20 Columbia Chemistry had 16 or 18 faculty, a third what other leading chemistry departments had. I am willing to believe that we can do as well.

On the other hand, I spend most of a decade at the University of Michigan, which had a good ed program, but did not have the extra sorts of staff that technical outreach would require. Ed schools are not, and cannot be, small. To meet the proposed objective, I would estimate that we would need a front-end investment of roughly 50 new full-time faculty and two or three new academic buildings to house them. We would also need a visitors committee to run things, since to my knowledge we have absolutely no one on the faculty with substantial funded research in K-12 education who could, for example, handle selection of these faculty. We could, of course, say that those of our colleagues who use their academic freedom to study pedagogy at K-12 should get together, but the shortage of substantial research programs in the area (say, individual faculty funded at $200,000/year, doable in education though not basic research from the NSF) suggests that gaining national leadership is not a readily accessible goal.

Perhaps we should try something more modest with the Worcester and Worcester suburban schools?

Good luck on this one. It sounds like a real challenge, particularly if you want something that matches what we actually do.