



ACCEPTING THE CHALLENGES: THE EMERGING ROLE OF GRAND RAPIDS COMMUNITY COLLEGE IN THE PREPARATION OF NEW TEACHERS

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In 1992, Grand Rapids Community College (GRCC) was one of six community colleges invited to participate in a NSF initiative to improve science and mathematics teaching within the state of Michigan. This initiative included all public teacher preparation institutions in the state. GRCC has responded to this challenge by:

- (1) designing a new course in Physical Science for future teachers;
- (2) creating the GRCC Teacher Education Pathway and the GRCC Teacher Education Center;
- (3) forming a local alliance with Grand Rapids Public Schools and Grand Valley State University for the purpose of recruiting and supporting minorities in mathematics and science teaching.

Background

In 1992, Grand Rapids Community College was one of six community colleges invited to participate in a NSF project to improve science and mathematics teaching at the state level. The Michigan Statewide Systemic Initiative (MSSI) was organized under the direction of the Michigan Department of Education. Several working groups were formulated and one, the Michigan Teacher Preparation Collaborative (MTPC), focused its energies on new teacher preparation. The MTPC soon drew representatives from every public teacher preparation institution in the state, a coalition of private colleges and a coalition representing the state's 28 community colleges. At the end of the funding cycle, community colleges were represented on the MTPC Executive Board and in all major working groups.

The three goals of MTPC are: (1) to improve the teaching and learning of science and mathematics by promoting instruction for active learning; (2) to create meaningful curricula; (3) to support equitable practice by extending opportunities for participation in science and mathematics to underrepresented groups. Statewide, colleges of education have given a close look at the kinds of experiences future math and science teachers need to be successful in the next century. New science and mathematics activities and courses have been written and shared at state conferences of the MTPC. Four local alliances have been formed uniting urban school districts with community colleges and public universities for the purpose of

recruiting and supporting minorities in mathematics and science teaching.

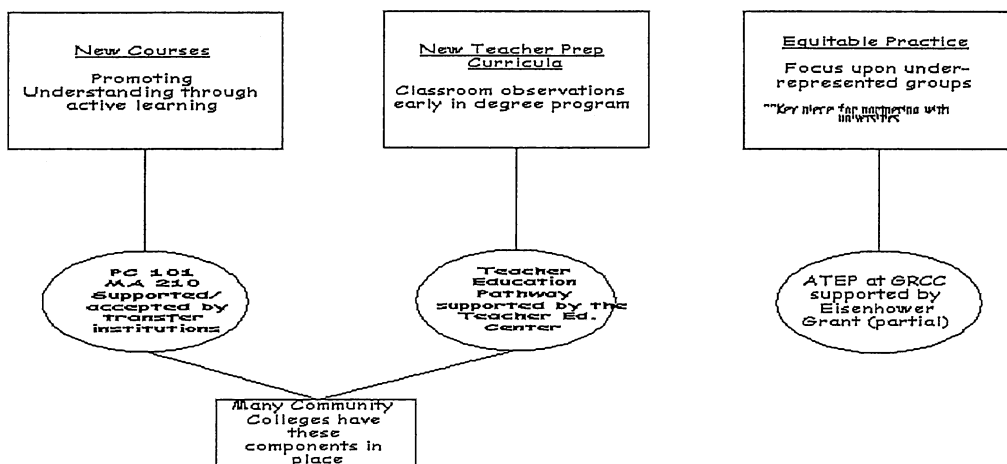
The administration, faculty and institutional support groups of Grand Rapids Community College have embraced the goals of the MTPC and are currently supporting several activities that will allow the college to accept an emerging role in the preparation of future teachers.

How Grand Rapids Community College Has Responded to MTPC Goals

GRCC has responded to MTPC goals in three areas:

- (1) designed a new course in Physical Science (PC-101) aimed at future teachers and updated an existing course in mathematics, Mathematics for Elementary Teachers (MA-210);
- (2) created the Grand Rapids Community College Teacher Education Pathway and established the GRCC Teacher Education Center;
- (3) joined in a local alliance with Grand Rapids Public Schools and Grand Valley State University for the purpose of recruiting and supporting minorities in mathematics and science teaching.

How GRCC Has Responded to MSSI/MTPC* Goals



*Michigan Statewide Systemic Initiative
 *Michigan Teacher Preparation Collaborative

New Courses

Driving Forces

In their article *The Role of Community Colleges in the Professional Development of Science Teachers*, Susan Loucks-Horsley, Rodger Bybee and Ellen Wild report that 44% of our nation's teachers begin their academic careers in community colleges [1]. For many elementary teachers community colleges will provide the only mathematics and science courses they will take on their way to a degree. It is imperative that these courses prepare future teachers to effectively meet state and national standards. Since beginning teachers typically teach the way they were taught, community colleges must respond by creating mathematics and science courses that are taught in ways that model the kinds of good teaching described in methods courses but too seldom experienced by the future teacher.

K-12 science education in the state of Michigan focuses on three content areas: Life Science, Earth Science, and Physical Science. GRCC currently offers courses in Life Science and Physical Science. A recommendation to write a new Earth Science course is pending the hiring of new faculty in this area for the fall 1998. Faculty from Life Science and Physical Science taking an active interest in new course development include a Michigan Science Teacher of the Year.

Physical Science (PC-101) was developed explicitly to meet the science transfer requirements of pre-service elementary teachers. PC-101 represents one attempt to teach science in ways envisioned by the MTPC and was selected by the National Science Foundation as an **Exemplary Activity** in the preparation of teachers. In its developmental stage, faculty from two Big Ten institutions and four regional transfer institutions were consulted on content, story-line, and teaching methods. In addition, the content and activities used in every class were matched with specific objectives taken from the *Michigan Essential Goals and Objectives for Science Education*. Three faculty members teach the five sections offered each semester. It is not uncommon to see more than one faculty member in the classroom participating in classroom activities with the students.

Content and Story-line

Content for PC-101 is taken from Chemistry and Physics. Matter, energy and the conservation laws form broad themes into which specific topics are organized. Using a

philosophy that *less is more*, this course starts with the **Story of the Atom** and subsequently uses invisible atoms and their parts to describe and explain phenomena in the students' everyday world. A key player in the **Story of the Atom** is the electron who leads students into discussions of the periodic table, bonding and chemical reactions. The electron continues to hold center stage as the content gently moves from the chemistry of batteries into the realm of electricity and physics. Here students use batteries, bulbs and wires to discover the concepts of simple circuits and current.

Use of Real World Contexts in an Activity Based Format

It's simple: a law, theory or concept isn't taught if it can't be linked to a real world context. As an example, last winter a local food chain introduced a new product, Heater Meals. This product uses a flameless ration heater (FRH) like those found in military food rations as the source of heat energy. Within two weeks the energy unit of PC-101 was rewritten to include a laboratory activity determining the heat output from a Heater Meal. Of the thirty class periods available, students are engaged in hands-on activities in over twenty class periods.

A Typical Lesson: Using Heater Meals to Teach about Energy

Informal classroom research on the entering conceptions of PC-101 students shows that many bring misconceptions about the source of heat energy liberated from exothermic reactions like the Heater Meal reaction. These misconceptions arise from confusion between nuclear and chemical changes. Discussions with students lead us to blame many years of high-tech sci-fi movies for this misconception. Many students believe that the energy liberated during the Heater Meal reaction comes from the conversion of matter into energy, a nuclear change, rather than a chemical process involving the breaking of existing bonds and the formation of new chemical bonds. Chemists know that heat energy is liberated during the latter step. To help students acquire the scientific conception they participate in the following activities:

- classroom discussions about the differences between physical, chemical, and nuclear changes highlighting common misconceptions surrounding the topics of heat and temperature.
- watching a video animation depicting the formation of hydrogen gas by the sharing of electrons in a covalent bond.

- reading and summarizing an article on Heater Meals in which the chemical reaction and sources of the heat energy are carefully described.
- conducting an experiment using a computer, a temperature probe, and a piece of a flameless ration heater to determine the amount of calories generated per gram of material.
- carefully describing the reaction process focusing upon the formation of bubbles which contain hydrogen gas.
- discussing the experiment with classmates and writing a clear statement explaining the source of the heat energy.

Collectively, these activities give students the opportunity to construct, use, and reflect upon their scientific knowledge.

New Curricula in Teacher Preparation

The Teacher Education Pathway at GRCC

The GRCC Teacher Education Pathway is a guide designed to help students make decisions about a career in teaching. The Pathway is an action plan for future teachers leading to an Associate Degree. The Pathway provides a list of suggested courses accepted by a majority of our transfer institutions. Features of the Pathway include a brochure on the teaching profession that serves as a recruiting tool while providing information such as: Why People Teach, Opportunities in the Teaching Profession, Who at GRCC is There To Help You and What To Do First.

Perhaps the most important component of the Pathway is the list of Faculty Mentors who have stepped forward to assist in the recruitment and support of future teachers. For many, joining the Faculty Mentors was a reaffirmation of the dignity of the teaching profession. Finally, GRCC is looking to re-tool course offerings in Education that were shelved during the teacher glut of the 70's. The Teacher Education Pathway has rekindled an interest to reopen these courses. Over twenty faculty, representing every discipline, have expressed an interest in developing and teaching these courses.

The GRCC Teacher Education Center

Grand Rapids Community College is currently preparing to open the Teacher Education

Center as the hub for Pathway activities. The Center will begin baseline data collection on elementary and secondary teacher education candidates during summer 1998. The Center will serve as a meeting place for education majors. Center staff will provide the first round of academic advising, and link students to the Counseling Department, Registrar's Office and Financial Aid Office. Faculty Mentors are given the option of holding one of their office hours at the Center.

Equitable Practice: Focusing Upon Underrepresented Groups

The Formation of a Local Alliance: An Experiment in Education

In 1995 the MTPC suggested the formation of local alliances as a way of taking mathematics and science reforms out of the colleges and into the communities which they serve. Statewide, the statistics on the number of minorities entering the teaching profession were disturbing. Even worse was the small number of minorities choosing careers in math and science teaching. With a majority of their current minority staff within five years of retirement, Grand Rapids Public Schools is facing a critical shortage of minority teachers, particularly in the areas of mathematics and science. Unfortunately, Grand Valley State University, our local public teacher preparation institution, only graduated three minority teachers out of 135 in 1997 – none in mathematics and science. Of the 600 designated education majors at Grand Rapids Community College (1997–1998) only three minority students indicated an interest in teaching mathematics and/or science.

In 1996 Grand Rapids Community College began exploring the possibility of entering into a local alliance with Grand Rapids Public Schools and Grand Valley State University to recruit and support minorities in mathematics and science teaching. Grand Valley State University is the transfer institution of choice for Grand Rapids Community College students. Over the course of one year, MSSSI representatives from these institutions met and discussed the need and role of each institution in the alliance. The alliance, if it were to succeed, would have to buck a history of prior failures. With a shared vision, a realistic evaluation of the resources available, and a commitment of key personnel, MSSSI representatives submitted a successful Eisenhower Grant proposal to support the West Michigan Alliance. **Helping Grand Rapids Home-Grow the Next Generation of Minority Teachers** became the alliance motto and has helped keep the vision of community service ahead of turf issues and personal agendas.

ATEP: The Umbrella Program that Closes the Loop

The key for success was a mechanism to close the loop in a pathway that started with Grand Rapids high school students and ended with these same students employed as teachers by Grand Rapids Public Schools. ATEP is an acronym for the AHAANA Teacher Education Program where AHAANA stands for Asian/Hispanic/African-American/Native American. The goal of ATEP is to recruit and support minority students into all areas of teaching, especially mathematics and science teaching.

ATEP operates within Grand Rapids Public Schools and Grand Rapids Community College. Students leaving ATEP enter Minority Teacher Education Center (MTEC) Programs at Grand Valley State University. In its first year of operation, ATEP hopes to be the vehicle that can create a cohort mentality among the participants at each institution.

Components of Success

Optimism for success is high among alliance members as cooperation is extending up and down the pipeline. Alliance members have pooled resources to hire an ATEP coordinator housed in the main offices of Grand Rapids Public Schools. Grand Rapids Public Schools has also appointed a YES Club (Young Educator Society) coordinator for the district to help oversee the development of YES Clubs at the four public high schools in the Grand Rapids Public Schools.

Grand Rapids Community College is developing ATEP at GRCC as an extension of that operating in Grand Rapids Public Schools. As a companion program, ATEP at GRCC will offer opportunities for financial aid, mentoring, education seminars for ATEP participants, and a carefully designed program leading to a seamless transfer into MTEC programs and the College of Education at Grand Valley State University. In the fall 1998, community college and university representatives will begin planning ways to match future teachers from GRCC with student volunteers from Grand Valley State University within Grand Rapids Public Schools' focus schools.

Grand Valley State University is currently working with Grand Rapids Public Schools to develop **focus schools in science and mathematics** for the placement of pre-service student volunteers and student teaching assignments. YES Club students, student teachers, and their

advisors will share planning times for informal discussions and seminars related to the teaching profession. Plans are being made for future teachers from GRCC ATEP program to help staff Pre-College Summer Science Camps held on the campus of GRCC.

Conclusion

In the past six years, Grand Rapids Community College has grown from a college of 6,500 to over 13,000 students. Education currently ranks third on the top ten list of declared majors. Enrollment figures from summer registration 1998 indicate that over 300 incoming freshpersons are interested in the teaching profession. This is an exciting time to be developing education programs as national, state, and local recruiting efforts refocus public sentiment on the importance and dignity of the teaching profession. In three years, Grand Rapids Community College has moved from the information gathering stage through the planning stage and into the implementation stage of new courses and programs. Grand Rapids Community College together with its K-12 and University partners is confident that this experiment in collaboration will be successful.

What started six years ago as an attempt by the NSF to improve the teaching of science and mathematics within the state of Michigan has reached the only level where systemic change can succeed – the local level. The progress of Grand Rapids Community College in the preparation of future teachers stands as a testament to risk taking on the part of the NSF to fund statewide initiatives that empower those with the willingness to work with the resources to carry out systemic change. ■

References

- [1] S. Loucks-Horsley, W. Bybee, and L. Wild, "The Role of Community Colleges in the Professional Development of Science Teachers", *Journal of College Science Teaching*, 26 130 (1996).