

THE INTEGRAL ROLE OF TULSA COMMUNITY COLLEGE IN THE MATHEMATICS AND SCIENCE PREPARATION OF PROSPECTIVE TEACHERS

C. THOMPSON

Tulsa Community College, Tulsa, OK 74115

The role of the two-year college in the mathematics and science preparation of prospective teachers is fast becoming a prominent influence on teacher education programs across the country. This article describes the multifaceted role of Tulsa Community College (TCC), Tulsa, Oklahoma, in the preparation of prospective teachers in math and science. Since 1987 Tulsa Community College has hosted many events, activities, and programs aimed at the sciences. TCC activities/programs have focused on five areas:

- (1) preservice and inservice preparation;
- (2) summer teacher institutes supported by state and federal grants;
- (3) recruitment and emphasis on underrepresented groups;
- (4) parateacher associate degree/certification program;
- (5) workshops, seminars, and other activities.

This article presents the TCC role by examining these five areas in terms of assessment of successful strategies, significant collaborations, and impact of the TCC teacher preparation activities on students and the community. Also presented are the implications for future TCC programs and the TCC vision for the math and science preparation of prospective teachers for the 21st century and beyond.

If the United States is to become first in the world in mathematics and science by the year 2000, the high quality preparation of K-12 math and science teachers is a critical requirement and must involve educational institutions at all levels. Even before the NCTM *Standards* [1] and *Everybody Counts* [2] in 1989, before the Presidential Goals for the year 2000 [3] were adopted, before the *AMATYC Crossroads* [4] was generated in 1995, and before the results of the National Assessment of Educational Progress (NAEP) indicated the paramount need for the quality preparation of teachers in mathematics and the sciences [5], Tulsa Community College, was continuously involved in programs and activities to recruit and prepare educators into mathematics and science education. Since 1987, Tulsa Community College has hosted a myriad of events, activities, and programs aimed at the recruitment and preparation of preservice and inservice preK-college math and science teachers as well as the math and science preparation of prospective teachers in all disciplines.

The multi-faceted role of Tulsa Community College in the science and mathematics preparation of prospective teachers is presented here in terms of program descriptions,

assessment, impact on students and the community, successful strategies and significant collaborations, and implications for future TCC programs and offerings.

Description of Activities

Five areas of focus exemplify the high quality efforts employed by Tulsa Community College over the past ten years relative to the field of math and science education:

1. Preservice and Inservice Preparation: The TCC SPICE (Special Preservice and Inservice Courses for Educators) Program begun in 1987 consists of college credit courses offered each semester in compressed, intensive, compact time periods that focus on specific interests and needs for teacher preparation and conform to the schedules of both inservice and preservice educators. Although the SPICE Program encompasses all disciplines/subject areas for educators in the preK-college grades, the inception and yearly focus of the program has always been in the areas of math and science education, because of the indicated need for community, state, and national assistance in these areas. Since Oklahoma has been identified as below the 50th percentile in both math and science achievement on most national polls, the need for the SPICE Program to accept these two areas has been paramount. A few examples of some SPICE courses that have been successful include: Using Manipulatives in Algebra Classrooms, Hands-On Aerospace for Teachers, Metric Madness for Teachers, Math in Children's Literature, HIV Peer Education for Teachers, Exploring Geology of Oklahoma for Educators, and Multicultural Math/Science for Teachers. Enrollment in TCC SPICE courses approximates 2000 per year with about 60% preservice educators and 40% inservice teachers. One huge success of the SPICE Program has been the mixing of veteran teachers with undergraduate education majors in hands-on classes that have fostered mentoring, idea exchanges, career advisement, and many other indirect benefits. In 1995, the TCC SPICE Program partnered with Rogers University in Tulsa to create the SPICE-Plus Program which has been offering graduate education courses for the past two years. This connection has enabled the community college students to easily transfer SPICE courses to any four-year institution in Oklahoma.

2. Summer Teacher Institutes supported by State and Federal Grants: Since 1995 TCC has been selected as the recipient of funds for Eisenhower/NSF grants to host summer *institutes* for K-12 teachers in the areas of math and science education. These include: "1995

Using M. & M.'s (Manipulatives and Multimedia) in Middle School Mathematics," a four-week summer institute for 20 math teachers grade 5 to 9 with Jenks Public Schools in partnership; "1996 Tulsa Math Equity Summer Teacher Institute," a two-week summer institute for 40 math/science teachers in partnership with Phillips Petroleum Company and Union Public Schools, and "1998 TEEMS: Teams Enhancing Eisenhower Math and Science Projects," a collaborative six-week institute with four school districts and four colleges across Oklahoma. Support for these activities was provided under the Eisenhower program, Phillips Petroleum, and the National Science Foundation.

3. Recruitment and Emphasis on Underrepresented Groups: The TCC Student Education Association was formed in 1994 to encourage community college students to become involved in activities associated with teaching, especially in the areas of math and science. This first focus of the TCC SEA was to begin an intensive math/science mentoring program at Monroe Middle School (adopted by TCC) which had been listed for five consecutive years on the "at risk" list. In addition, the TCC SEA has hosted staff development programs for the Monroe teachers, conducted tours of the math and science labs in Tulsa area schools, hosted speakers for parent and teacher groups in the community, visited Phillips Petroleum Company, Westinghouse, and Ford Glass plants for examining engineering and equity practices in math and science, have attended Oklahoma Math and Science Teacher Conferences, and have participated in many other events and activities that directly relate to math/science education. In 1997, the TCC SEA was awarded \$4000 in Future Teacher Scholars Scholarship tuition fee waivers to be awarded to undergraduate math or science education majors. Eight SEA students were awarded \$500 each.

4. Parateacher Associate Degree/Certification Program: In 1996 TCC was selected to participate as the only two-year school in Oklahoma (with five four-year institutions) in the Oklahoma Teacher Collaborative to encourage the preparation of math/science teachers that is funded under the NSF Collaboratives for Excellence in Preparation of Teachers to develop a curriculum and degree program for certifying parateachers (formerly known as teachers aides) in a two-year associate degree/certification plan specifically in the areas of math and science. The grant provides incentive tuition fee waivers for students interested in pursuing a parateacher associate degree/certificate in the areas of math or science. To date, approximately 40 students are currently enrolled in the TCC math/science parateacher

program.

5. Workshops/Seminars/Conferences/and Other Activities: In addition to hosting the Oklahoma/Tulsa Councils of Mathematics Teachers and Science Teachers Associations annual meetings since 1985, TCC has supported the following projects: Mind Over Math Seminar (1985-over 300 parents and teachers); Hands-On Science/Math Workshop for Tulsa Catholic Diocese Teachers (1986-over 100 teachers); Robotics for the Classroom (1987-over 200 teachers); Math Counts Competition and Teacher Coaching Preparation (annually since 1993-over 500 teachers); Implementing the NCTM Standards Workshop (annually since 1989-over 500 parents and teachers); Math and Science Summer Academies for High School Students (annually since 1990-over 600 students); Math Manipulatives/Technology/Science Laboratories Workshops (annually since 1987-over 1000 teachers); and many college programs for children, adolescents, and parents featuring non-credit courses focusing on math and science education since 1985. Also, TCC has fully equipped its mathematics and science laboratories with the materials and technology needed for teaching math and science college courses per the *Standards* [1] and reform strategies.

Assessment and Impact

Current assessment practices of the TCC five areas of focus for the math and science preparation of prospective teachers include faculty/course/program evaluations, enrollment/student participation patterns, community involvement, and the identification of successful strategies and significant collaborations. Results of these assessment procedures indicate highly rated effectiveness for faculty and course offerings and high quality programs in all five of the focus areas. Enrollment and student participation patterns reveal continuous increases in growth. The strong positive impact of the TCC activities on students and the community is evidenced by the substantially consistent support demonstrated by student interest, enrollment, and participation, and by the active commitment of the community to the college's marketing and support activities.

Demonstrated examples of community support are the numerous significant collaborations that have evolved connecting the TCC math/science education activities with the educational communities across Oklahoma. These include: (a) endorsement/marketing assistance for TCC from virtually all public and private school districts across the state and including the

Oklahoma State Department of Education; (b) collaborative authoring with TCC of state and federal grant proposals with various universities, businesses, and school districts; (c) connecting TCC degree programs with various state/private universities' teacher education programs; and (d) the development of an advisory professional development committee of regional schools/colleges/universities for supplying direction and assistance for TCC activities. Many of the successful strategies of the TCC exemplary activities identified by the assessment procedures have been a product of these significant collaboratives.

One powerful exemplary strategy identified by TCC students and the educational community focuses on the way in which the activities/courses/programs are created from the expressed needs of the educational community rather than the college dictating the offerings. In addition, TCC activities, courses, programs are flexible and change consistently in content to reflect the reform and issues concerns of math and science education preparation for prospective teachers. Flexible scheduling of course offerings to appropriately meet the needs of the adult college student, such as weekends, evenings, and mini-concentrated time periods to accommodate work and family schedules is also a priority.

An overall assessment of the TCC exemplary activities to date reveals high quality preservice opportunities in the math and science preparation of prospective educators.

Future Implications

Implications of the five focus areas of TCC exemplary activities for the future preparation teachers in math and science involves the college's vision regarding technology for the 21st century and beyond. Plans are currently underway for the construction of the Tulsa Area Professional Development Center, to be housed and co-directed by Tulsa Community College and the area school collaboratives, focusing on the math, science, and technology preparation of preservice and inservice educators. Also, the creation of an information network/list-serve operation center at TCC for electronically keeping students and the educational community updated and informed of the latest news and issues in their field is planned for the near future.

The TCC vision for the future includes a solid commitment to the improvement of math and science education. This presentation provides only a sketch of the total picture and total vision embraced by TCC for the future. TCC stands committed to providing high quality

programs and activities for the encouragement, recruitment, preparation, retention and empowerment of teachers in math and science education. TCC remains steadfast in the implementation of the *Standards* in math and science, especially in the focus area of equity. Providing excellence in teaching and in math and science education for all students regardless of age, gender, ethnicity, ability level or disability/handicap, geographic or socioeconomic background, or philosophical/religious background is a primary goal for Tulsa Community College for the 21st century and beyond. ■

References

- [1] *Curriculum and Evaluation Standards for School Mathematics*, National Council of Teachers of Mathematics, Reston, VA, 1989.
- [2] *Everybody Counts*, National Research Council, Washington, DC, 1989.
- [3] *America 2000*, U.S. Department of Education, Washington, DC, 1991.
- [4] *Crossroads in Mathematics*, American Mathematical Association of Two-Year Colleges, Memphis, TN, 1995.
- [5] *NAEP 1996 Mathematics Report Card for the Nation and the States*, National Center for Education Statistics, Washington, DC, 1997.