

THE VIRGINIA COLLABORATIVE FOR EXCELLENCE IN THE PREPARATION OF TEACHERS

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The Virginia Collaborative for Excellence in the Preparation of Teachers (VCEPT) is a joint undertaking of a group of Virginia colleges and universities to improve all aspects of their programs to prepare individuals to teach mathematics and science in grades K-8. Major funding for the work to improve the teacher preparation programs was provided by grants totaling more than six million dollars from the Collaboratives for Excellence in Teacher Preparation (CETP) program of the National Science Foundation (NSF) that supported work from May 1996 through October 2002. The NSF has also funded a three-year, follow-on component featuring a support process for new VCEPT teachers and long term program evaluation. The core four-year institutions were Virginia Commonwealth University, Norfolk State University, Mary Washington College, and Longwood University. Participating two-year colleges included Germanna Community College, Tidewater Community College, and J. Sargeant Reynolds Community College. The Mathematics & Science Center of the central Virginia school systems served as the major link to schools and teachers, and the Virginia Mathematics and Science Coalition (VMSC) served as VCEPT's Policy Advisory Board. Midway through the project the University of Virginia, the College of William and Mary, and Virginia Union University formally associated themselves with VCEPT.

Through VCEPT, the core institutions each dramatically, and for the long-term, improved all aspects of their K-8 math/science teacher preparation programs. In addition, improvements have taken place in programs at many other Virginia institutions, and policy changes have taken place that have transformed teacher preparation programs throughout Virginia and beyond. Some of the results of VCEPT are described in this introduction, and in reports on a sample of VCEPT's work that are included in this Special Issue.

The work of VCEPT took place in the following areas: policy; courses; in-school experiences; recruitment and retention; and, cross-fertilization, dissemination and evaluation. The papers selected to appear in this Special Issue report on samples of this work, and are briefly described in this introduction.

Policy

As VCEPT's Policy Advisory Board, the VMSC was a key partner in bringing about changes in policy. Policy changes occurred in a number of areas.

Mathematics and Science Requirements for Prospective K-6 Teachers — Prior to VCEPT, there were no specific state requirements concerning the number of mathematics and science credit hours to be completed by future elementary school teachers. Many teacher preparation programs required only a total of six credits in mathematics and science, and VCEPT colleges required little more. Our first step was to change requirements of VCEPT colleges; then, a major initiative was mounted to change state policy. State policy for alternate licensure and expectations for approved programs now include a total of 24 hours of mathematics and science for the K-6 license.

Requirements for Future Middle School Teachers — Before VCEPT, individuals could be fully certified to teach middle school mathematics and science by virtue of having the equivalent of a minor in language arts and a minor in social studies. As confirmed by a study commissioned by VCEPT and VMSC [1] the majority of Virginia's mathematics and science teachers do not have the equivalent of a minor in their field. All Virginia colleges combined were producing an average of twelve new middle school teachers a year with the equivalent of a minor in mathematics or science. As a direct result of VCEPT and VMSC policy efforts, new middle school teachers must now have the equivalent of a minor in the area they teach. VCEPT colleges have developed new programs to prepare these teachers.

Role of Community Colleges in the Preparation of Teachers — Before VCEPT, the important role of community colleges in the preparation of teachers was not recognized in Virginia. Very few two-year colleges offered any courses or programs designed to prepare future teachers and there was little recognition of the fact that 40% of future teachers completed some or all of their mathematics and science in two-year colleges. At the request of the NSF, VCEPT played a key role in planning and conducting a national workshop, *The Integral Role of the Two-Year College in the Science and Mathematics Preparation of Prospective Teachers* [2]. The local planning committee was led by VCEPT participants Debbie Fisher and Susan Wood of J. Sargeant

Reynolds Community College. The report of this workshop has had a major impact nationally and within Virginia, and was instrumental in the creation of a Virginia community college system-wide Taskforce on Teacher Preparation. The Taskforce created two PRAXIS preparation courses, and an *Introduction to Teaching as a Profession* course. These courses are now offered statewide in colleges which previously had no presence in teacher preparation. Teresa Galyean and Susan Wood, who co-chaired the Taskforce, were formally recognized by VMSC in September 2002 for their achievement among “Programs That Work.”

Courses

The change in policy requires future teachers to study significantly more science and mathematics, but even more important than the quantity is the nature and quality of the coursework taken by prospective teachers.

At its inception, VCEPT faculty agreed on a detailed set of general criteria for all courses to be developed. In summary, the VCEPT criteria expects that the courses should: enhance active student learning; assist students to make connections with other disciplines; make use of appropriate teaching methods and technologies; provide students with an understanding of state and national standards; and, engage students in a variety of assessment situations.

A total of more than sixty courses exhibiting these criteria have been developed and offered at VCEPT institutions and are described on the VCEPT web page [3].

General Education Courses — VCEPT faculty are convinced that courses satisfying the VCEPT criteria are not only appropriate for future teachers, but provide the best education for all students. One such biology course offered at Virginia Commonwealth University is described by Joseph Chinnici in “A Model General Education Science Course Involving Humanities and Sciences, Education, and Medical School Collaboration.” A mathematics general education course at Mary Washington College that was designed to meet VCEPT criteria is described by Debra Hydorn in “Enhancing Finite Mathematics with Global Awareness.” A physics course and a chemistry course designed at Norfolk State University to meet the needs of future teachers, but also serve as exemplary general education courses, are described by S. Raj Chaudhury in “The Science Studio—A Workshop Approach to Introductory Physical Science” and H. Alan Rowe in “The Use of Dramatic Demonstrations to Enhance the Motivation and Learning of Chemistry Students.” In “Mathematics for a Non-Science Majors Chemistry Course,” Don Shillady of

Virginia Commonwealth University describes *Chemistry in the News* as being designed especially for future teachers, but also recommended for all general education students.

Courses Offered Primarily for Teachers — In “Case Studies from an Integrated Mathematics and Science Course,” Phillip McNeil describes an interdisciplinary mathematics and science course offered by Norfolk State University that is particularly appropriate for teachers. William Haver and Joseph Chinnici adapted this course and have offered it four times for future elementary and middle school teachers at VCU. VCEPT has recognized the importance of geometry for teachers. In “Revision of a Non-Euclidean Geometry Course Based on the van Hiele Model of the Development of Geometric Thought,” Marie Sheckels describes a geometry course offered at Mary Washington College that is designed for future middle and high school teachers. Loren Pitt has taken the lead within VCEPT in developing and offering geometry courses for future elementary teachers. The course he describes, “Thinking about Geometry: Laying a Foundation for Future K-8 Teachers,” is offered at the University of Virginia and has been adapted for use at five other Virginia colleges. All VCEPT courses enable future teachers to gain competence with technology. A major focus on enabling future teachers at Virginia Commonwealth University to learn science and gain skills with advanced technology is described by Robert Fisher, Jonathan Ha, and Joseph Chinnici in “Integration of Technology in Math and Science Education—A Model for Teaching Elementary and Middle School Pre-Service Teachers.”

Methods Courses — Mathematics, science, and education faculty worked together on a VCEPT taskforce to support each institution’s efforts to improve its mathematics and science methods courses. At Virginia Commonwealth University, the focus was on adding the use of appropriate technology to the existing efforts. Johnny Johnson and Laura Wilkowski report in “Using Technology Within the Teacher Preparation Program as a Model for Effective Instruction” on the impact of adding the use of technology to science methods courses.

In-School Experiences

A key component of VCEPT’s effort is the development and institutionalization of programs to make a major improvement in the in-school experiences of new teachers. In “The Impact of a Clinical Faculty Institute on Participants’ Skills for Mentoring Novice Teachers, Grades K-8,” Julia Cothron, Executive Director of the Mathematics & Science Center, and George Bass, VCEPT evaluator, describe the Clinical Faculty Institutes that prepared outstanding

teachers to enhance experiences for new teachers. Each VCEPT institution is making extensive use of these newly trained Clinical Faculty.

Early Experiences in Schools — Many VCEPT colleges did not have mechanisms to provide future teachers with opportunities to be actively involved in the schools until late in the college programs. Taking advantage of the relationships developed with Clinical Faculty, various VCEPT institutions provided opportunities for freshmen and sophomores to work in after school tutoring and mentoring programs. Diane Simon described the VCEPT-supported Project BEST [4]. VCEPT also provides students with opportunities to observe and participate in classes during the regular school day. Gayle Childers, of J. Sargeant Reynolds Community College, describes such a program in “A Collaborative Pre-Practicum Apprentice Program Gives a Community College a Jump-Start in Teacher Preparation.”

Recruitment/Retention

VCEPT’s major recruitment/retention tool is an extensive apprentice teacher program. The recruitment effort focuses on increasing the number of African-American future K-8 teachers; the number of male future K-8 teachers; and, the number of future K-8 teachers with extensive interest and course work in mathematics and science. Coupled with the Pre-Practicum Apprentice Program mentioned above, these experiences served to introduce prospects to a realm of teaching activities and thereby attract them to the profession.

Apprentices in College Courses — Many of the prospective future teachers served as teaching apprentices in newly developed VCEPT general education courses. One example of the use of apprentices is described by Joseph Chinnici in “A Model General Education Science Course Involving Humanities and Sciences, Education, and Medical School Collaboration.”

Tutoring and Mentoring — As described in the previous section, the opportunity to have contact with students and classrooms proved to be a powerful recruitment tool. Grant funding provided minimal student wages for these activities.

NSF Teaching Scholars — Based on their interest and potential in mathematics and science teaching, 250 NSF Teaching Scholars were selected at VCEPT institutions. These teachers were supported by NSF funding of a half million dollars over five years and were recognized at special VCEPT ceremonies.

Cross-Fertilization/Dissemination/Evaluation

In our view, the extensive impact of VCEPT is due to a large degree to the extensive cross-fertilization, classroom visitations, collaborative course evaluations, and collegial colloquia that occurred throughout the funding period.

Summer Institute — Each year, a Summer Institute was offered featuring college courses developed with VCEPT support. Rotating Institutes were held at Virginia Commonwealth University, J. Sargeant Reynolds Community College, Norfolk State University, Mary Washington College, and Longwood University. Each course was team-taught by faculty from at least two VCEPT institutions and by teaching apprentices or Clinical Faculty. The courses described in this special issue by Phillip McNeil, Raj Chaudhury, Alan Rowe, Johnny Johnson and Laura Wilkowski, Don Shillady, Debra Hydorn, and Loren Pitt were each visited during at least one Summer Institute. Altogether, at least 500 structured visits to approximately 35 VCEPT courses took place during the duration of VCEPT.

Evaluation of VCEPT Courses — Each VCEPT course is visited on an extensive basis; a detailed description of each VCEPT course and a description of the extent to which the course meets the VCEPT criteria for course development is described on the VCEPT web page [3]. In “Evaluating Reform Teaching in College Courses—Action Evaluation is Action Research,” George Bass describes the external evaluation of the courses.

Dissemination — The major unfinished business of VCEPT is to respond to the fact that Virginia’s colleges are still not producing the needed number of future middle school science and mathematics teachers. We have received a grant from the Fund for Improvement of Postsecondary Education of the United States Department of Education to enable ten Virginia colleges and universities to expand and improve our middle school teacher preparation programs. This effort is described on the program website and features exchange visits by paired teams from the member colleges and universities to disseminate successful program aspects statewide [5]. This expanded group of initial VCEPT institutions will work together toward the goal of producing many more well prepared middle school mathematics and science teachers.

VCEPT Follow-On Project — The three-year follow-on project began in 2001 with a dual focus. First, special mentoring support is provided to novice teachers trained through the VCEPT programs at partner institutions. These teachers who are entering the profession are paired with

VCEPT trained Clinical Faculty for mentoring and are provided stipend support aimed at involving the teachers in professional meetings, conferences, and additional professional development opportunities. The second focus involves classroom evaluation of these new VCEPT teachers under the direction of George Bass, the VCEPT evaluator, in an attempt to measure the effectiveness of the VCEPT program in preparing mathematics and science teachers. This evaluation will be integrated into an overall NSF evaluation of its CETP program.

Conclusion

On behalf of VCEPT, we would like to acknowledge and express our appreciation for the support provided by the Division of Undergraduate Education of the National Science Foundation. Without this support, the extensive improvements to our teacher preparation programs would not have occurred. The articles in this Special Issue section represent only a small portion of the work accomplishments of VCEPT, but we believe it to be a fair depiction of the work of the Collaborative. ■

References

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- [3] Virginia Collaborative for Excellence in the Preparation of Teachers Website, <http://vcept.longwood.edu/>
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- [5] Preparation of Middle School Mathematics and Science Teachers in Virginia Website, http://www.math.vcu.edu/Preparation_of_middle_school_teachers/