OREGON COLLABORATIVE FOR EXCELLENCE IN THE PREPARATION OF TEACHERS—AN OVERVIEW

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Introduction

The Oregon Collaborative for Excellence in the Preparation of Teachers (OCEPT), funded in 1997 by the National Science Foundation, was created to improve the mathematics and science preparation of future teachers in Oregon and to increase the diversity of the population of students preparing to be teachers. In pursuit of these goals, OCEPT has directly involved well over 200 science, technology, engineering and mathematics (STEM) and education faculty, administrators, and academic advisors from virtually all of the 34 institutions of higher education in the state, as well as K-12 teachers from numerous school districts.

Background

The OCEPT project was fortunate to begin in an environment with many positive features. Oregon, in general, has very high standards for teacher preparation. All teachers have to pass national exams in their teaching fields, and the passing standards for Oregon's teachers are some of the highest in the nation. In addition, most secondary teachers earn majors in their teaching discipline.

However, there was general consensus that several areas needed attention. Mathematics and science courses for majors provided excellent content background for secondary teachers, but the courses often did not model the pedagogy reflected in the national standards or current research on teaching and learning [1]. While most of the state universities and community colleges offered a somewhat agreed-upon mathematics sequence for elementary teachers, it was not offered at every university with a teacher education program. Science requirements for future elementary teachers varied greatly among the different institutions, and often were inappropriate as the only science experiences for these elementary teachers. Few institutions

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offered additional mathematics or science courses or programs designed especially for upper elementary and middle school teachers. The proportion of teachers of color was very small compared to the proportion of K-12 students of color, and the state was producing very few teachers from underrepresented groups.

In addition to courses and teaching, the other systemic issue that needed attention was the chasm that seemed to exist on many of the state's campuses between the undergraduate STEM programs and the (often graduate) teacher education programs. There was little communication among faculty or advisors in the two programs and no shared vision that both programs are essential in the preparation of teachers. Neither community colleges nor universities were fully aware of the magnitude of the role played by community colleges in the preparation of teachers. Although STEM faculty often knew colleagues in their discipline on other campuses or in other disciplines on their own campus, few had opportunities to develop close ties with them or to work together on issues related to mathematics or science education.

What We Did

Given the identified needs, professional development for university and community college faculty was the first major focus of OCEPT. Intensive three-week summer institutes engaged Faculty Fellows in shared experiences in learning new mathematics and science content. Faculty participated in varied types of learning activities that reflected current research, became better acquainted with teacher licensure procedures in the state, collaborated with education faculty from their own institution, and became familiar with the national Standards documents from NCTM, NRC, and AAAS [2-4]. Disciplinary and special interest groups were formed to facilitate continued communication and collaborative work across institutional and disciplinary lines. Experienced classroom teachers were integrated into the summer institutes, and some also held visiting teacher-in-residence positions at several campuses. They served as members of the disciplinary and special interest groups and as mentors to college faculty.

Building on existing networks, such as the long established broad-based policy organization Oregon Mathematics Education Council and the more informal Teachers of Teachers of Mathematics, companion science organizations (Oregon Science Education Council and Teachers of Teachers of Science) were created in order to sustain activity beyond the end of the grant. The councils have broad representation from business, industry, private and public

universities and community colleges, and K-12 teachers and administrators. They provide advice and counsel to: the Oregon Board of Higher Education; the Oregon Department of Education; the Teachers Standards and Practices Commission (the state's teacher licensing agency); and, the state's educational institutions and their STEM and education programs. Collaborative activities were also instituted with other existing science and mathematics professional organizations, such as Oregon Science Teachers Association and Oregon Council of Teachers of Mathematics, Oregon Chapter of American Association of Physics Teachers, and Oregon Academy of Science.

Although identification and advising of pre-teacher education students was not originally a major component of the project, it emerged as an important focus. In particular, the early identification (at the high school level or during the first two years of collegiate work) of students interested in becoming teachers appeared as a critical issue early in the OCEPT project. Institutions offering licensure through graduate "fifth year" teacher education programs had no undergraduate "education" degree or other means by which to identify students. Community college education programs were usually designed for early childhood education, and sometimes students interested in secondary teaching were misplaced into such programs. An OCEPT "Student Goals and Interests Survey" form was developed to help identify future teachers [5]. Institutions were encouraged and supported to 1) provide early advising on selection of appropriate courses and major; 2) get pre-teacher education students involved in future teachers organizations; and, 3) engage students in early field experiences with children in the community and peer teaching experiences on campus. Future teachers clubs were started on several campuses and very successful Future Teachers Conferences held at Linn-Benton Community College and Portland Community College—each attracting more than 200 participants—which involved undergraduate students from several institutions in planning and organizing the conferences.

With Oregon's population approximately 85% Caucasian and only approximately 4% of the teaching force from underrepresented groups, achieving diversity in the education profession has been a challenge. To build an infrastructure to support increased diversity, 31 cooperative group learning courses were developed at eleven institutions to support retention and success in key mathematics, biology, chemistry, and physics courses. Many of the programs were modeled on Uri Treisman's Emerging Scholars Program, first developed at the University of California, Berkeley. These were often called Math Excel, Chem Excel, etc. Others were modeled on the

Peer-Led Team Learning (PLTL) model first developed as part of the NSF-funded Workshop Chemistry project based at City University of New York.

When the OCEPT staff realized that many STEM faculty were not experienced in writing about teaching issues and curriculum changes, and often were unfamiliar with journals that published such papers, WRITE ON! writing retreats were created. These retreats were designed to support faculty dissemination efforts about their work with OCEPT. To our surprise and pleasure, faculty also praised them as one of the best professional development experiences they had experienced.

What Was Accomplished

As a result of OCEPT, more than fifty courses and programs were developed and over 175 courses revised at more than 25 institutions. Faculty have reported: 1) using more variety in their teaching and assessment strategies; 2) adopting standards-based instructional techniques; and, 3) promoting opportunities for student teaching and tutoring experiences in K-12 schools. OCEPT-influenced classrooms are more interactive, have a greater use of instructional technology, and emphasize conceptual development with a focus on scientific inquiry and/or mathematics problem solving.

Mathematics programs for middle school teachers were developed at Western Oregon University and Southern Oregon University to complement Portland State University's existing program. Since many middle school teachers of mathematics and science were originally prepared as elementary teachers, the challenge now is to extend these programs to serve these practicing middle school teachers in all regions of the state in order to strengthen their mathematics content knowledge and understanding.

Linn-Benton, Chemeketa, Treasure Valley, Blue Mountain, Central Oregon, and Portland Community Colleges, along with Oregon State, Western Oregon, Eastern Oregon, and Portland State Universities, and the Universities of Oregon and Portland, have all made progress in building science programs especially designed for students aimed at the elementary/middle level licensure. A guide describing many of these programs and their courses, currently in development, will serve as a resource for other science faculty and departments.

The University of Oregon has developed a new science-oriented Pathways program and Pacific University has implemented a new undergraduate major for elementary teachers that strengthens their content preparation. Most of the universities with graduate teacher education programs are now exploring or developing similar programs.

Early field experiences in K-12 classrooms have become part of some mathematics and science courses, and been used both to give STEM students experience with the content in another setting and to encourage STEM students to consider teaching as a career. A handbook for faculty on strategies for incorporating early field experiences into mathematics and science classes was developed to assist faculty in providing such opportunities.

The success of the Excel and PLTL programs led to the institutionalization of many of them. It also led to changes within other science and mathematics courses as faculty recognized the positive effects of strategies employed in these programs. Peer teaching experiences through the PLTL and Excel programs developed on several campuses have changed the character of lower division courses on those campuses. They have also proved to be a valuable method of inciting student interest in teaching.

Advising and support for students interested in becoming teachers has been improved. A mathematics and science Advising Guide, created by OCEPT Co-P.I. Camille Wainwright, provides important information about all the teacher education programs, including their mathematics, science, and technology requirements. It has proved useful to academic advisors and to pre-teacher education students alike. Similar advising guides were subsequently developed in the areas of language arts and the social sciences. Information from these guides has been incorporated into a state Advising Guide available on the website of the Oregon University System [6].

Articulation of pre-teacher education programs among institutions has been strengthened. While all of Oregon's community colleges and public universities already had transfer articulation agreements in place when OCEPT started, several institutions have extended their transfer agreements to accommodate the special needs of pre-teacher education students. In addition, several community colleges and universities now have co-admission agreements, by which students are admitted simultaneously to both a community college and a university, with student advising and program planning becoming a joint responsibility of the two institutions. Some

community colleges have also developed articulation agreements with private universities. Cooperation with the annual University/Community College Articulation and Transfer Conference, sponsored by the Oregon University System, and special OCEPT pre-teacher education advising workshops have greatly strengthened advising and articulation for pre-teacher education students.

The Oregon Science Education Council and Oregon Mathematics Education Council have both produced and disseminated "Recommendations for the Science/Mathematics Preparation of Teachers" for Oregon, based on national and state standards [7,8].

WRITE ON! retreats have now been instituted by some other projects and also some institutions, and they have also been offered specifically for experienced and beginning K-12 teachers of mathematics or science. The Oregon Council of Teachers of Mathematics and the Oregon Science Teachers Association are now exploring ways of incorporating this model into their annual "leaders institutes," each of which brings together approximately 150 teacher leaders and early career teachers with leadership potential. Elaine Jane Cole, OCEPT Project Manager, has been the organizer and leader of the WRITE ON! retreats.

A Mentor Advocacy Partnership, described by many as an unusual collaboration of representatives of school boards, school administrators, teachers union, Department of Education, teacher licensing agency, and higher education was formed to promote the development of mentoring programs for beginning teachers and to obtain legislative support for these programs. Based on the Early Career Mentor Program piloted by OCEPT, the Oregon Council of Teachers of Mathematics and the Oregon Science Teachers Association are now committed to provide more mentoring and professional development for beginning teachers.

To assess the project and its impact, OCEPT commissioned case studies of institutional change at six institutions that have actively participated in OCEPT. It also conducted an annual survey of students entering teacher education programs who plan to be elementary or secondary mathematics or science teachers. OCEPT has also instituted the Outcomes Research Study to look deeply at the mathematics and science background and teaching practices of newly prepared teachers and of STEM faculty who taught them. The Outcomes Research Study is described in Camille Wainwright's article for this journal, "The Development of Instruments for Assessment

of Instructional Practices in Standards-Based Teaching" and the Study will continue for the next three years through the new OCEPT II grant under her direction at Pacific University.

Aspects that Contributed to OCEPT Success

The entire project modeled cooperative group learning. Nearly all the institutes and workshops were planned and conducted by the participants themselves. Leadership of discipline and special interest groups emerged from within the groups. The project itself was managed by dedicated volunteers and staff representing a variety of institutions and disciplinary interests.

K-12 classroom teachers were recognized as full partners and colleagues. They were participants and leaders throughout the project. Their role was invaluable in helping college and university faculty develop or revise courses and implement new teaching strategies.

OCEPT raised the awareness of the *scholarship of teaching* among STEM faculty. By fostering scholarly work by mathematics and science faculty which focused on their own teaching, more of them now consider this sort of reflection and investigation a regular part of their role as a faculty member.

Working through existing professional organizations and agencies enabled participants to see OCEPT goals and activities as a part of their shared responsibility, increasing the interest in issues relating to the preparation of future teachers, and thus providing venues for continued efforts.

In summary, the OCEPT project initially targeted individual Faculty Fellows in college mathematics and science departments. OCEPT contributed to the increased number of new teachers in mathematics and the sciences, and helped start programs which over time will increase the diversity of the teaching force. However, its major focus throughout the project has been to improve the quality of preparation of new teachers of mathematics and science. Perhaps the greatest indicator of the effect of OCEPT is a noticeable change in perspectives of faculty and academic advisors throughout the state. Their circle of "colleagues and friends" now includes people on many different campuses and in different disciplines. Their "interests" include thinking about how things are taught as well as what is being taught; recognizing the importance of learning subject matter knowledge in conjunction with learning about teaching the subject; and, actively encouraging good students to become teachers. These informal networks and

personal changes of mathematics, science, and education faculty and advisors that were developed during the project may prove to be one of the most long-lasting and significant contributions of OCEPT.

In addition to these changes at a personal level, we believe that the education systems have also been influenced in a positive way. For example, in an independent review of the seventeen teacher education programs in the state, they all, without prompting, mentioned that the progress they were making in improving their programs had been significantly increased by the impact of OCEPT on their campus. Thus, OCEPT became a catalyst for systemic change throughout the state, influencing not only individuals, but also agencies, organizations and institutions, providing momentum at all levels for the continued improvement of teacher preparation in Oregon.

We hope that you enjoy this special issue, in which OCEPT participants share various aspects of OCEPT from their own perspectives.

Bio

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References

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