

July 2008

## **Master of Arts in Teaching K-9 Mathematics Eastern Washington University**

### **Introduction**

Eastern Washington University seeks approval to establish a Master of Arts in Teaching K-9 Mathematics degree program. The program title was chosen in recognition of the importance of the elementary and middle school years in forming children's perceptions of mathematics.

Housed within the College of Science, Health and Engineering, the proposed program would offer courses at both the Cheney and Riverpoint campuses to certified elementary and middle school teachers who wish to advance their understanding of the teaching and learning of mathematics. It would complement an existing secondary school mathematics instruction concentration in EWU's MS in Mathematics Program; however, it would differ from EWU's existing K-8 certificate program in terms of focus, depth and target audience. It would enroll 2.4 FTE students in fall 2008 and would achieve full enrollment of 10.8 FTE by 2013. At full enrollment, it would graduate nine students per year, who would be prepared to serve as instructional models and instructional leaders in their schools.

### **Relationship to Institutional Role and Mission and the Strategic Master Plan for Higher Education in Washington**

The proposed program would support EWU's mission to prepare broadly educated, technologically proficient, and highly productive citizens in several ways; it would do so primarily by providing an opportunity for practicing elementary and middle school teachers to increase their mathematics content knowledge for teaching<sup>1</sup> to help them be more effective and productive. It also would support EWU President Arévalo's emphasis on K-16 education and his initiative to develop an institute for teacher mentoring and teacher excellence. In addition, the proposed program would support the *Strategic Master Plan for Higher Education* by expanding opportunities for postsecondary degree completion in a field that the plan specifically identifies as an area of need.<sup>2</sup>

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<sup>1</sup> The term "content knowledge for teaching" encompasses content knowledge plus pedagogical content knowledge.

<sup>2</sup> Page 19 of the *Strategic Master Plan* states "In elementary and middle schools especially, many teachers feel unprepared to help students achieve the higher levels of skill in math and science they will need. These teachers need help."

## Diversity

To supplement the services available through EWU's campus-wide diversity initiative, program planners would coordinate and consult with EWU's Vice Provost for Diversity and Faculty Fellow for Diversity to develop recruitment and retention strategies responsive to the specific needs and barriers of minority groups, including the following:

- Working closely with leadership of the Africana Education Program, American Indian Studies Program, Chicano Education Program, and Women's and Gender Studies Programs to strongly encourage diverse students to enroll in undergraduate teacher education programs on campus.
- Learning from the aforementioned leadership how to support students so that they might return for the proposed program.
- Working with professional organizations like WEA and WSPA to get word of the program out to teachers of color.
- Advertising in minority news outlets, such as Tribal College Journal and Latino Perspectives in Higher Education.
- Working through minority civic organizations and tribal agencies to publicize the program.
- Consulting with on-campus students and faculty of color, as well as other possible external stakeholders, to vet recruitment publications and Web-based materials to ensure that they will be helpful to students from diverse backgrounds.
- Conducting and presenting research opportunities designed to support and encourage a diverse perspective or to address issues of teaching in diverse settings or with diverse populations.
- Regularly assessing recruitment/retention efforts with regard to underrepresented populations.
- Continually monitoring the program's culture of appreciation and respect towards diversity.

## Program Need

As evidence of student need for the program, program planners cited inquiries from EWU alumni and participants in professional development programs. More formally, in 2006, program planners surveyed 30 Eastern Washington region participants in EWU's Mathematics Case Study Project professional development grant program for math teachers. More than 20 responded that they were interested in a mathematics education master's program. The survey was repeated in 2008 with another cohort of 25 participants, and over half expressed interest.

Another source of student demand for the program would be teachers seeking Washington State professional certification or seeking highly qualified status with respect to *No Child Left Behind* requirements. Based on discussions with teachers from local schools and participants in professional development grants, program planners estimate that from 100 to 200 teachers within commuting distance of EWU might be interested in gaining highly qualified status. It seems likely that some would stay on to obtain a master's degree; however, that particular pool would diminish over time as undergraduate teacher preparation programs adjust.

As evidence of employer need, program planners provided letters of support from Cheney Public Schools' director of curriculum and instruction and Spokane Public Schools' secondary and elementary mathematics coordinators. In addition, program planners cited the Office of the Superintendent of Public Instruction's (OSPI's) report, *Educator Supply and Demand in Washington State* (2006), which lists mathematics as a teacher shortage field. Moreover, the report notes that school districts surveyed within Educational Service District 101 (which includes Spokane and Cheney) perceived a math teacher shortage of 4.19 on a scale ranging from 1 (considerable surplus) to 5 (considerable shortage). Scores of 3.41-4.2 represent some shortage, and scores of 4.21 and up represent considerable shortage.

The HECB's *State and Regional Needs Assessment Report* recommends that the state higher education system develop strategies to increase the numbers of K-12 teachers and administrators in key shortage areas. According to the report, elementary and middle school regular education teaching occupations constitute two out of the top five long-preparation, high-demand occupations in Spokane County.

As evidence of community need for the proposed program at the state level, program planners cited *Washington Learns*. The proposed program would implement Washington Learns' strategy of building expertise in math teaching. At the national level, the National Mathematics Advisory Panel's *Foundations for Success: The Final Report of the National Mathematics Advisory Panel* (2008) recommends that: "The mathematics preparation of elementary and middle school teachers must be strengthened as one means for improving teachers' effectiveness in the classroom . . . A critical component of this recommendation is that teachers be given ample opportunities to learn mathematics for teaching."

In addition to providing evidence for student, employer, and community need for the proposed program, program planners provided evidence the proposed program would not unnecessarily duplicate existing programs. Although other institutions in Central and Eastern Washington offer master's programs for teachers, those programs have a different focus. For example, CWU offers a MA in Teaching focused on middle and secondary math, and WSU offers a master's program focused on secondary math. The only program in the state comparable to the proposed program is the mathematics concentration within The Evergreen State College's M.Ed. in Curriculum and Instruction, which was approved by the HECB in January 2008.

## **Program Description**

The proposed program aims to help working elementary and middle school teachers advance their understanding of teaching and learning mathematics and to enable them to become leaders in school mathematics teaching, curriculum planning, and teacher development. Since most students would be working full-time, the program would be structured so that it could be completed in two years, including summers, and would offer evening and weekend classes at the Cheney and Riverpoint campuses to accommodate students' work schedules.

To be admitted, students must meet the general regulations for admission to graduate programs at EWU and hold a bachelor's degree and a current teaching certificate; submit recommendations from three persons in the field of education, including a current or former supervisor; take the GRE; and demonstrate entry-level competency on an inventory of mathematics content knowledge for teaching.

Once admitted, each student would take 37 credits of core courses and at least 11 credits of electives. The core course credits would include a capstone experience consisting of at least three 600-level research report credits. The program core would be taught entirely by full-time tenure-track faculty, who all possess doctorates in mathematics education.

Students would normally complete the program in two years and would achieve the following learning outcomes:

- Attain a deep and connected understanding of mathematics concepts;
- Attain a deep and connected understanding of pedagogical content knowledge;
- Understand the research base for teaching mathematics;
- Incorporate research findings to solve practical issues of teaching K-9 mathematics;
- Understand the role of and demonstrate effective assessment in mathematics teaching and learning;
- Understand the role of and demonstrate the effective use of appropriate technology in the teaching and learning of mathematics;
- Understand developmental, historical, and socio-cultural influences on mathematics learning; and
- Understand perspectives, roles and issues in math leadership.

These student-learning outcomes would be measured using a variety of assessment tools including quizzes and exams, research projects, term papers, portfolios, or other special projects with an emphasis on content knowledge for teaching. Students would be assessed within their individual courses, based on learning outcomes identified for those courses. Learning outcomes for each course have been clearly defined and aligned with the program-level learning outcomes stated above. In addition to course assessments, students would be assessed through a process involving interviews, writing, and a portfolio targeted to address broad program goals and goals related to each student's grade band focus, needs and interests. Finally, students would be assessed with a capstone research project, report and oral presentation.

The proposed program would participate in EWU's regular 10-year assessment cycle, which includes departmental self study, external review, and internal review. In addition, the program would conduct ongoing program-level assessment measures, including:

- An annual review of course outcomes and measures on a course-by-course basis.
- A formal biennial assessment of course content and pedagogy by the Mathematics Education Committee.
- Review of student portfolios.
- Informal discussions with students.
- Discussions with school district personnel.
- Feedback from school district supervisors (e.g., site administrators of graduates), initially, at graduation and one year later.
- Student entry and exit surveys.
- Graduate surveys at one-, two-, and five- year intervals that would ask questions related to: program structure, pedagogies and content; satisfaction with the program; degree to which the program met student expectations and goals; and perceptions of the degree to which the program enhanced the abilities of the participants to effectively improve their teaching or mathematics leadership abilities.

Data from all of the above measures would be used to assess and revise content and curriculum of the proposed program, as needed.

### **Program Costs**

The proposed program would enroll 2.4 FTE students in the first year, growing to full enrollment of 10.8 FTE students by the sixth year. To implement the program, its planners have budgeted 0.1 FTE for administrative staff and 0.5 FTE for faculty. The proposed program would use existing office space and library resources, so the budget excludes those items. It would be funded by internal reallocation, with negligible adverse impact on other departments or programs.

At full enrollment of 10.8 student FTE, the total cost of instruction would be \$65,136, or \$6,031 per FTE. This falls in the lower middle range of average annual cost per FTE for graduate students majoring in education at comprehensive institutions. According to the HECB's *2005-06 Education Cost Study (July 2007)*, the direct cost of instruction per average annual education graduate student FTE at comprehensive institutions ranged from \$4,732 to \$8,555.

### **Public Comment**

Dr. Moheb Ghali, Acting Provost and Vice President of Academic Affairs at Western Washington University, submitted a letter indicating that Dr. Tjalling Ypma, Chair of WWU's Department of Mathematics and Dr. Jerry Johnson, Professor of Mathematics, thoroughly reviewed the proposal and strongly supported the efforts of EWU in establishing the proposed program. They did note a few issues which they felt merited further attention: potential minimal entry requirements; potential duplication of K-8 credential program content and pedagogy; less than expected mathematics content beyond the K-8 level; potential that switching tenure-track faculty from current assignments would require the use of less well qualified lecturers to teach courses required for the standard credential; and potential unfeasibility of evening courses being offered without additional resources.

Program planners responded as follows:

- Other master's programs have similar entry requirements.
- The time and credits would differ considerably from those in the K-8 credential program.
- This is an MA in teaching K-9 mathematics focused on serving practicing teacher's needs, not an MA or MS in mathematics.
- Next year, only five out of 22 undergraduate mathematics education courses would be taught by lecturers (all of whom are experienced, and one of whom is ABD in mathematics education), which is a lower percentage of lecturers than peer institutions appear to be employing for comparable courses.
- Since most courses would be three credit courses, a faculty member could teach two graduate courses in lieu of one five-credit undergraduate class, and increase student class load by only one credit. Moreover, there would be sufficient undergraduate courses with fewer than five credits so faculty could easily accommodate a graduate course or two.

## External Review

Five reviewers received a draft copy of the proposal and submitted review letters: Dr. James King, Associate Professor of Mathematics, University of Washington; Dr. Melfried Olson, Mathematics Researcher, University of Hawaii; Dr. William Speer, Professor of Mathematics Education, University of Nevada Las Vegas; Dr. David Davison, Professor, Departments of Mathematics and Educational Theory & Practice, Montana State University Billings; and Dr. Sheryl Maxwell, Associate Professor of Mathematics Education, Department of Instruction and Curriculum Leadership, College of Education, University of Memphis.

All five reviewers endorsed the proposed program. Noted strengths included sound curriculum design (3 reviewers) and faculty quality as evidenced by the large number of full-time faculty. Although three reviewers had a few concerns about details such as the sufficiency of the program's technology emphasis or the number of elective credits, none of the concerns were "deal breakers," and program planners responded satisfactorily.

## Staff Analysis

The proposed program would support EWU's mission by providing an opportunity for practicing elementary and middle school teachers to become more effective and productive. It would also support EWU President Arévalo's emphasis on K-16 education and his initiative to develop an institute for teacher mentoring and teacher excellence. In addition, the proposed program would support the *Strategic Master Plan for Higher Education* by expanding opportunities for postsecondary degree completion in a field the Plan specifically identifies as an area of need. Furthermore, it would employ multiple strategies to enhance diversity.

Program planners provided sufficient evidence of student, employer, and community need for the proposed program. Student surveys and inquiries indicate sufficient student demand. OSPI's *Educator Supply and Demand in Washington State* and the HECB's *State and Regional Needs Assessment Report* indicate sufficient employer demand. *Washington Learns* and the National Mathematics Advisory Panel's *Foundations for Success: The Final Report of the National Mathematics Advisory Panel* indicate sufficient community demand. Rather than unnecessarily duplicating existing programs, the proposed program would complement them by providing students east of the Cascades with an opportunity analogous to that provided by the mathematics concentration in TESC's M.Ed. in Curriculum and Instruction program west of the Cascades.

The program would achieve distinction in three ways: 1) in its focus on elementary and middle school teachers; 2) by immersing students in significant mathematical experiences that enrich their understanding of the mathematics they teach; and 3) by helping students use these experiences as a lens to explore issues in the research, teaching and learning of mathematics.

Students would be taught by full-time tenure-track faculty who hold doctorates. Students would be assessed in a variety of ways that would include a capstone research report. Program assessment would employ multiple measures as well.

The proposed program would take advantage of the strength of EWU's mathematics education faculty, who have gained significant experience providing professional development to practicing mathematics teachers through several regional and local professional development grant projects. It is noteworthy that the faculty member who would serve as the proposed program's director voluntarily obtained five external reviews of the proposal when only two were required. It is also noteworthy that five out of five external reviewers endorsed the proposed program.

### **Staff Recommendation**

After careful review of the proposal and supporting materials, staff recommends approval of the Master of Arts in Teaching K-9 Mathematics, to be offered at Eastern Washington University's Cheney and Riverpoint locations. The HECB Education Committee discussed the proposal during its June 23, 2008 meeting and recommended approval by the full Board.

**RESOLUTION NO. 08-19**

WHEREAS, Eastern Washington University proposes to offer a Master of Arts in Teaching K-9 Mathematics; and

WHEREAS, The program would support the institution's mission by providing an opportunity for practicing teachers to become more effective and productive; and

WHEREAS, The program would support the *Strategic Master Plan for Higher Education* by expanding opportunities for postsecondary degree completion in a field the plan specifically identifies as an area of need; and

WHEREAS, The program would employ multiple strategies to enhance diversity; and

WHEREAS, Students would benefit from the program's emphasis on significant mathematical experiences for elementary and middle school teachers; and

WHEREAS, Student learning outcomes are clearly identified and would be assessed in multiple ways, including a capstone research project; and

WHEREAS, The program would not unnecessarily duplicate existing programs in Washington and would be offered at a reasonable cost; and

WHEREAS, The program would be delivered at Eastern Washington University's Cheney and Riverpoint locations;

THEREFORE, BE IT RESOLVED, That the Higher Education Coordinating Board approves the Master of Arts in Teaching K-9 Mathematics at Eastern Washington University's Cheney and Riverpoint locations, effective July 21, 2008.

Adopted:

July 21, 2008

Attest:

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Bill Grinstein, Chair

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Roberta Greene, Secretary