Professional Development for Teachers
The 2006-08 Educators’ Professional Development Institute Series (EPDIS)
Developing Algebraic Thinking

- Applications are due by November 13, 2006
- Selections and notifications will be made by November 20, 2006.
- Earn 10 graduate credits.
- Cost: $400.

Sponsored by
Michigan Technological University
Western Upper Peninsula Center for Science, Mathematics, and Environmental Education
Grand Rapids Area PreCollege Engineering Program
Kalamazoo Schools
Detroit Public Schools/Detroit Area PreCollege Engineering Program Schools
Beecher Community Schools

Funded by
A Michigan Department of Education Improving Teacher Quality Grant to Michigan Technological University
Summary—
EPDIS combines short workshops and learning groups during the academic year with a one-week institute during summer 2007 and a two-week institute in summer 2008. Periodically, videoconferencing will allow participants to interact during the academic year. In addition, there will be three optional professional development activities for a limited number of participants.

Opportunity—
EPDIS: Developing Algebraic Thinking will strengthen the ability of teachers to engage students in meaningful problem solving and to serve as role models and mentors for new and pre-service teachers. Teachers will—

- increase and deepen their mathematics knowledge
- improve their ability to convey knowledge and applications of mathematics in the classroom
- meet the goals of the Michigan Curriculum Framework and national standards
- develop their confidence to lead local and statewide collaborative work to improve teaching and learning
- improve their understanding of diverse perspectives and their use of interdisciplinary approaches
- enhance their ability to integrate technology for effective learning

Advantages—
The EPDIS: Developing Algebraic Thinking project will include approaches that support effective teaching for meaningful and relevant learning. EPDIS will focus on strategies to create equitable learning environments, to engage students in inquiry-based learning and deep understanding of core concepts, and to develop methods to allow students to communicate what they know.

It will provide opportunities to build teacher knowledge and skills and provide tools to self-assess and reflect on teaching practices in order to ensure continuous improvement and increase student learning. This approach will help teachers create learning communities, link learning to state and national curriculum frameworks, and connect to community needs and school improvement goals. It will encourage teachers to take leadership roles in their schools and state. EPDIS will be taught by instructors who model these teaching approaches.

During the 2006-07 school year—
Participants will attend a workshop on Grade Level Content Expectations (GLCEs) at the middle school level and how those relate to high school content. They will then find student achievement gaps. From these, each teacher will develop a professional development plan that highlights the areas of instruction or content to focus on during the remainder of EPDIS.

Workshops will be held at two to three sites to maximize access for participating teachers. The program will also offer an online course which engages participants through interactive technology in reading and discussions about how students learn to think algebraically, teaching for understanding, building on students’ prior or intuitive knowledge, changing mathematics curricula, learning strategies, and diversity issues.

During summer 2007—
Teachers from partner schools will participate in a one-week intensive institute on Michigan Tech’s campus. Dr. Shari Stockero, Assistant Professor of Mathematics Education, has designed a program to strengthen teachers’ mathematics content knowledge.

An introductory session, “Dealing with Cultural Diversity,” led by Dr. Marvel Lang of Michigan State University, will help participants understanding of the nuances and perspectives of cultural diversity. It will sensitize participants to the need to recognize the current and future diversity in the classroom and larger community and provide participants with information on strategies to deal successfully with the nuances of cultural diversity every day.
Exercises will emphasize practical applications. The institute, “Developing Algebraic Thinking,” will use video case studies as a context for the analysis of pedagogical and mathematical issues in order to strengthen teacher understanding of the mathematics of linear function and associated pedagogical issues.

**During the 2007-08 academic year—**

Participants will engage in “Lesson Study,” an intensive method of improving instruction by examining the effectiveness of lessons in engaging students in meaningful learning. At least three groups of teachers will be established, based upon their geographic location. Each group will focus on how students react to a lesson through observation. The group will plan a lesson that one member teaches to his/her students, while other group members observe how students are learning and where problem areas exist. The group then uses their observations to improve the lesson, which can be used by each member with his/her students.

**In the second summer 2008—**

Teachers will attend a two-week institute that integrates mathematics and engineering applications. This institute includes applications and projects used by the engineering profession, such as scheduling and estimating, quality control, and stress analysis.

Teams of teachers will design, analyze, build, and test truss bridges. They will also analyze water quality data and computer-based data on climate change. Applications of these materials in individual classrooms will be refined, technologies to enhance learning will be explored, and STEM careers will be discussed.

**Notes—**

The summer institutes at Michigan Tech will utilize the University’s unique resources, facilities, faculty, and learning environment.

The online education courses will be available during the second academic year. The optional summer courses are primarily field-based, and previous participants will be eligible for stipends if all seats are not claimed by participants in this program.

**Selection criteria—**

Enrollment is competitive and is limited to eighteen participants.

**Credit—**

Earn 10 graduate credits.

**Sponsors—**

Michigan Technological University, Western Upper Peninsula Center for Science, Mathematics, and Environmental Education, Grand Rapids Area PreCollege Engineering Program, Kalamazoo Schools, Beecher Community Schools, and Flint Public Schools. Funded by a Michigan Department of Education Improving Teacher Quality Grant to Michigan Tech.

Educators’ Professional Development Institute Series  
Department of Educational Opportunity  
Michigan Technological University  
103 Alumni House  
1400 Townsend Drive  
Houghton, MI 49931  
906-487-2263  
lori@mtu.edu
Plan-Objective and Timeline: Developing Algebraic Thinking

<table>
<thead>
<tr>
<th>Core Courses</th>
<th>Activity</th>
<th>Objectives</th>
<th>How/Where/#Teachers</th>
<th>Time Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 2006</td>
<td>Program Orientation</td>
<td>Collaborative Leadership</td>
<td>Live/3 sites/18 teachers</td>
<td>3 hours</td>
</tr>
<tr>
<td>November 30, 2006 or December 1, 2006</td>
<td>Middle School Content</td>
<td>MCF &amp; National Standards</td>
<td>Live/3 sites/18 teachers</td>
<td>3 hours</td>
</tr>
<tr>
<td>Spring Semester 2007</td>
<td>Web CT Reflections</td>
<td>Diverse Perspectives</td>
<td>Online/MTU/18 teachers</td>
<td>1 credit</td>
</tr>
<tr>
<td>March 6-8, 2007</td>
<td>Connecting w/ the Learner Workshops</td>
<td>Diverse Perspectives</td>
<td>Live/3 sites/18 teachers</td>
<td>1 credit</td>
</tr>
<tr>
<td>June 24-29, 2007</td>
<td>Developing Algebraic Thinking Institute</td>
<td>MCF &amp; National Standards</td>
<td>Live at MTU/18 teachers</td>
<td>1 week = 3 credits</td>
</tr>
<tr>
<td>October/November 2007</td>
<td>Lesson Study Workshops</td>
<td>Collaborative Leadership</td>
<td>Live/3 sites/3 times/18 teachers</td>
<td>1 credit</td>
</tr>
<tr>
<td>June 16-27, 2008</td>
<td>Exploring Mathematics through Engineering Applications Institute</td>
<td>Deepen Content Knowledge Applications of Math</td>
<td>Live at MTU/18 Teachers</td>
<td>2 weeks = 4 credits</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Optional Courses</th>
<th>Activity</th>
<th>Objectives</th>
<th>How/Where/#Teachers</th>
<th>Time Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 17-23, 2007</td>
<td>Isle Royale Biometrics</td>
<td>Deepen Content Knowledge Applications of Math</td>
<td>Live at MTU/Isle Royale/8 Teachers</td>
<td>1 week = 3 credits</td>
</tr>
<tr>
<td>July 2007</td>
<td>Engineering for Earth Science Education</td>
<td>Applications of Math</td>
<td>Live at MTU/8 Teachers</td>
<td>1 week = 2 credits</td>
</tr>
<tr>
<td>Spring Semester 2008</td>
<td>Learning Materials, Inquiry, and Assessment Course</td>
<td>MCF &amp; National Standards</td>
<td>Online/MTU/8 Teachers</td>
<td>2 credits</td>
</tr>
</tbody>
</table>

“To teach is to learn twice.”
—Joseph Joubert