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4 [A Vision for Ohio Mathematics Education](#)

[Janet M. Herrelko](#), University of Dayton

This article presents a vision for Ohio mathematics education that recognizes five points to maximize the success of Ohio students today and in the future. The proposal recognizes that Ohio graduates need more mathematics and science to succeed in the job market and higher education. Present state sponsored projects are noted and how classroom teachers can engage in preparing for a cooperative, sustained effort to move Ohio mathematics education into the Information Age.

8 [Professional Development Supporting Teacher Reflection: Building the Relationship Between Standards, Research, and Teacher Reflective Practice](#)

[Stephen J. Pape](#), The Ohio State University; [Beth Greene Costner](#), Winthrop University

Teachers are being asked to do more each day. To meet changing expectations, teachers are seeking professional development opportunities that support their efforts to build a connected understanding of mathematical concepts and ways to help their students develop this deep understanding. The *Teacher-Researcher* program sought to facilitate teachers' efforts to develop the theoretical frameworks and content knowledge necessary to structure and support their reflection about substantive issues related to their instructional practices. Four examples of the teachers' action research projects are highlighted to illustrate their classroom-based explorations. Teacher learning resulting from these investigations is discussed.

15 [Lessons Learned from a Questioning Adventure](#)

[Michelle K. Reed](#), Wright State University; [Rebecca R. Brickell](#), Pleasant View Middle School; [Sharon L. Heeter](#), Pleasant View Middle School; [Virginia E. Nicholson](#), Ridgeview Middle School; [Stephen J. Pape](#), The Ohio State University

Five members of a two-year professional development program discuss what they have discovered from their investigation of the dynamics of classroom interaction. Three teachers provide a look into how they collected and analyzed data, which ultimately led them to a greater understanding of the complexity of their classrooms. Originally the teachers focused their research projects on types of questions they asked during a lesson, but broadened their project to include such areas as using wait time, discussion, and follow-up questions. Together the participants learned to ask more higher-level questions in order to receive better explanations from students, to wait longer after asking questions to give students time to process their explanations, to provide richer experiences to help students connect with the mathematics concepts, and to press students to justify their answers by asking follow-up questions.

21 **Stimulating Conversations: An Example from a Sixth-Grade Mathematics Classroom**

Nancy Bringardner, Ridgeview Middle School; **Stephen J. Pape**, The Ohio State University

As classroom mathematics teachers, we strive to improve the level of students' thinking and understanding by introducing engaging and relevant lessons. Through the *Teacher-Researcher* program (see Pape & Costner, this issue), it became evident to the first author of this article that facilitating learning through such lessons required changing the ways in which these lessons were discussed in her classroom. Thus, we worked to engage students in lessons that encouraged them to actively discuss mathematics including debate, clarification, and justification of content. This article describes some of what we learned through this process within three analytical categories: (1) teacher's role as facilitator of student discussion; (2) students' role in mathematical discourse; and (3) changing student responses and student initiated elaborations.

28 **Middle School Students' Identities as Mathematicians: The Quest Beyond Mere Content**

Clare V. Bell, Columbus Public Schools; **Stephen J. Pape**, The Ohio State University

Adolescence is a time of dramatic change—a time of evaluation, self-organization, decision-making, and commitment. Middle school students identify themselves as musicians, writers, artists, or athletes but do not often identify themselves as mathematicians. In this article we present a yearlong investigation of the relationship between students' developing identification as mathematicians and classroom practices that promote mathematical reasoning. Although growth in mathematical thinking and communication did not result in a significant change in the number of students who identified with being a mathematician, the growth exhibited in students' descriptions of the work of a mathematician may be the initial step toward feelings of competence—feelings that could lead to identification with being a mathematicians.

35 **Writing as a Tool for Learning in Mathematics: A Case Study in Eighth-Grade Algebra**

Jonily M. Zupancic, Gahanna Middle School South; **Drew K. Ishii**, The Ohio State University

This article is an overview of a problem solving process and how this process is used to help eighth grade students learn and understand mathematics. The emphasis is on writing in the mathematics class, and how writing and using this problem solving process helps students think about their thinking. The article describes the results of an action research project that took place in an eighth grade Algebra I classroom.

41 **If Pi Were Equal to 3...**

Alfinio Flores, Arizona State University

This article compares two ways to approximate the value of pi, by using the perimeter and the area of polygons inscribed in a circle. Students can see the significance of rounding pi to a given

number of decimal places. Comparing the two ways of approximation will give students the opportunity to observe particular instances of the formula $\sin 2a = 2 \sin a \cos a$.

45 **The Role of Children's Literature in a Mathematics Classroom**

Meredith J. Dolgin, University of Toledo

Students in American schools today are not fully benefiting from the current mathematics curriculum. Teachers have the responsibility of providing relevant, worthwhile mathematical experiences to promote student understanding and enjoyment of mathematics. Children's literature presents a non-threatening, integrated approach to teaching mathematics. Using children's literature in a mathematics classroom also promotes real-world and mathematical connections, increases student interest, incorporates problem solving, and influences visual learning and the use of mathematical language. Teachers must consider various ideas when planning and teaching an effective lesson incorporating children's literature and mathematics.

52 **An Evening Session at OCTM**

James E. Schultz, Ohio University

Not available.

55 **Playing Darts, Finding Pi and the Area Under a Function (ACTIVITY)**

Jan Erik Woldmar, Ale Gymnasium

Not available.

58 **Developing Formula Skills (ACTIVITY)**

Ed Laughbaum, The Ohio State University

59 **A World of Symmetry (ACTIVITY)**

David E. Kullman, Miami University

61 **Multiplying Binomials (ACTIVITY)**

Miriam Holmes, Walnut Springs Middle School (Westerville); **Ed Laughbaum**, Ohio State