

POSITION PAPER

December 18, 2003

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End of Instruction Algebra I - What do these scores indicate?

According to the Oklahoma State Department of Education, 22 % of our students achieved a satisfactory score or better on the standards-based Algebra I End of Instruction (EOI) test given to all students enrolled in Algebra I. The Oklahoma Council of Teachers of Mathematics (OCTM) and the Coalition for the Advancement of Science and Mathematics Education in Oklahoma (CASMEO) have provided a series of questions and answers featured below. It is their goal to improve mathematics education in Oklahoma for the benefit of students, teachers, community and economic well being. They believe it is necessary to take proactive steps that require the understanding and cooperation of all stakeholders over an extended period of time to improve student achievement.

What is Algebra?

The study of algebra is a development of reasoning that can be used to explore and represent dynamic relationships in the world. It incorporates a variety of strategies to understand patterns, quantitative relationships, and rates of change in many contexts. The most common algebra strategies involve the manipulations of mathematical symbols that represent how changes in one variable produce changes in other quantities. Learning strategies include graphs, charts, tables, and the use of graphing calculators and computer software.

Why are the Algebra I End of Instruction (EOI) scores so low?

Historically the first year a test is given the scores are often low due to lack of understanding of the expectations and rigor involved in successfully completing the test. For example, when Texas first gave an Algebra I End of Instruction test in 1996 there was a 27 % pass rate; however, by 2002 students were passing at the 60% level. Keeping this in mind, there are several other issues that could be factors including:

- This is the first year the test was given with actual scores reported so inadequate test preparation or lack of test preparation may have contributed to low scores.
- Some of the test items may emphasize algebraic content and reasoning in a context not traditionally emphasized in an Algebra I course; hence, professional development and appropriate resources may need to be provided in order to enhance instruction.
- Student accountability is currently minimal and may not necessarily encourage the student to do well on the test.
- Some students presently enrolled in high school Algebra I courses have not gained the pre-requisite knowledge and skills needed to succeed. This points to a need for the implementation and mastery of the Oklahoma *PASS* standards in all preceding mathematics instruction.

Why is the study of Algebra I important anyway?

In a document entitled *Before It's Too Late: A Report to the Nation from The National Commission on Mathematics and Science Teaching for the 21st Century* chaired by Senator John Glenn, four important reasons were given for our children to achieve competency in mathematics and science:

- "the rapid pace of change in both the increasingly interdependent global economy and in the American workplace demands widespread mathematics- and science-related knowledge and abilities;
- our citizens need both mathematics and science *reasoning* for their everyday decision-making; (wording in italics was added to the document)
- mathematics and science are inextricably linked to the nation's security interests; and
- the deeper, intrinsic value of mathematical and scientific knowledge shape and define our common life, history, and culture."

www.ed.gov/inits/Math/glenn/toolate-exccsum.html

What can Parents do?

Parents play an important role in shaping their child's attitude toward mathematics. By supporting the study of Algebra, parents exhibit high expectations for their child and for the school. Other ways to support success in mathematics include:

- Promote perseverance, support in-depth study, and encourage looking for patterns in the world.
- Ensure that homework is consistently completed in a timely manner and that it is taken seriously.

- Support regular school attendance.
- Encourage students to request additional assistance from the teacher inside and outside of regular class time.
- Stay informed about the student's performance through frequent communications with teachers.
- Set academics as a priority.

What can Schools do?

Building a firm foundation in beginning algebra concepts during the elementary and middle school years eases the shift from arithmetic to the more advanced mathematics topics found in high school. As students progress to these higher levels of algebra, teachers need new approaches to help students see how the algebra they are learning in school relates to real world issues and applies to other subjects. Schools must make time and dedicate financial resources for their 4th-8th grade teachers as well as high school mathematics teachers to receive extensive professional development in order to address both of these issues.

The Dana Center (Austin, Texas) conducted a study of 378 Texas schools that had the largest improvements as well as schools with the largest declines in the percentage of students passing their end of instruction Algebra I test. The following is a summary of their recommendations based on what the researchers found to be key factors driving the schools that were successful:

- Set Algebra I as a priority.
- Provide fiscal resources and planned professional development that will support Algebra I teachers throughout the school year along with opportunities and compensation for additional training during the summer.
- Provide common planning time for Algebra I teachers.
- Establish internal performance standards and accountability systems for the district and campuses.
- Provide highly qualified and experienced Algebra I teachers for all students and provide mentors for less experienced Algebra I teachers.
- Have high expectations that all students can learn the Algebra I outlined in the state standards (e.g., Oklahoma's *PASS* document) and provide students with appropriate materials and resources throughout the year, including graphing calculators.

(www.tenet.edu/teks/math)

What can Policy Makers do?

All of the suggestions listed below require increased funding and in some cases additional training.

- Systematically provide quality professional development to mathematics teachers at the elementary, middle and high school grades over a sustained period of time that increases teachers' content and technology knowledge integrated with how students learn mathematics and effective teaching strategies.
- Provide for early intervention in elementary grades so that students will master the skills that are prerequisite for success in Algebra I.
- Release more sample Algebra I test items to better inform teachers of the high expectations implied in these items.
- Design a state Algebra I test that is supported by the use of technology as the ACT and SAT exams do.
- Add student/parent accountability into the system in order to motivate young people to do their best.

In summary, it is important that we use this first experience with Algebra I EOI testing as a benchmark to provide improved classroom testing procedures, innovative instruction, and student accountability for success in algebra. Schools, teachers, parents, professional organizations and state level education leaders and policy makers need to cooperatively work together to attain our common goal – the improvement of teaching and learning in mathematics.