



January 20, 2009

Kay Williams
Assoc. Professor of Education
Hanover College
P.O. Box 890
Hanover, IN 47243

Re: EcO₁₅ Grant

Dear Kay,

Congratulations, \$7,500 has been allocated to Hanover College through the Community Foundation of Madison and Jefferson County's Economic Opportunities through Education by 2015 (EcO₁₅) Grant. We are pleased to partner with you and local math teachers as part of the I-STEM Algebra Readiness initiative.

Enclosed you will find a Grant Agreement for your review. Please have both copies signed, keep one for your records and return the other to my office. Once this document is returned, you may access funds according to the procedures outlined in the Agreement.

Please feel free to contact me with any questions.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kathy', is written over a faint, larger version of the same signature.

Kathy Huffman
Jefferson County EcO15 Coordinator
590 Ivy Tech Drive
Madison, IN 47250
265-2580 ext. 4305

Encls. Grant Agreement (two copies)
Program Report form
Financial Report form
Request for Advance or Reimbursement

An initiative of the Community Foundation of Madison and Jefferson County
214 East Main St., Madison, IN 42750
www.cfmjc.org

Dawn Carlson
Dr. Kay Williams
EDU 335
11 March 2009

Analysis of Border Problem Student Work

Dr. Williams facilitated the border problem activity at Shaw and Madison Junior High. In addition to observing the Shaw activity, I examined all of the student work. The activity fostered several algebraic habits of mind, and the task is a high-level cognitive demand task.

The student work demonstrated algebraic habits of mind. The facets addressed under "building rules to represent functions" were organizing information and different representations. In order to solve the problem, students wrote out how they reached a solution for a specific border problem. For example, the students showed how to find the border for a 6 by 6 grid. The students needed to understand the example before describing the rule. Many of the students also used a pictorial representation to organize their thinking. Although the students were told not to count how many squares were in the border, the picture on paper could help the students manipulate and see what the problem was. The task was aimed at getting the students to be able to describe the rule for finding the border of an $N \times N$ grid. The habit of mind "abstracting from computation" was also addressed in the border problem. Students generalized beyond examples, wrote equivalent expressions, used symbolic expressions, and employed computational shortcuts. In the student work, some groups wrote down multiple ways to find the border of a grid using calculations. For each calculation, they received the same answer. Although I am not sure how many students made the connection, all the methods for calculating the border boiled down to the same solution. The students were asked to generalize beyond the specific examples used in class. The goal was to write a symbolic expression that could be used to find the border of a grid with unknown size. Some students were able to clearly write the symbolic expression while many students struggled to generalize beyond the specific examples. Students seemed confused about when to multiply and when to add when writing symbolic expressions, and they struggled to understand exactly what "e" or "n" meant in the problem. At least the task started getting students to write symbolic expressions and think deeply about how to do it. Even if students did not write a correct symbolic expression, the students had to organize information and explore different representations. The students were also able to use computational shortcuts to figure out the border of other specific examples once the first problem was done in class. Although an occasional group showed getting input from output, the work did not seem to show a large amount of "doing and undoing".

In addition to addressing several algebraic habits of mind, this border task is a high-level cognitive task. I would label it as a "procedures with connections task". Based on the description of a high level task, the border problem is high-level because it developed deeper understanding of area, operations, and perimeter, gave the students some freedom to choose how to work the problem, allowed for multiple representations, and required cognitive effort. The students were given some direction, especially between examples and generalization, but students could choose how to figure out the border. Some students used grids while others could immediately write an expression to find the border of the grid. When I observed at Shaw, the students had to talk with their groups and students shared their methods for finding the border with the class. Students had to verbalize and demonstrate their methods to the entire class. In order to write a correct symbolic expression, the students needed to understand the different ways to find the border. For example, you can find the perimeter and subtract four corners from that perimeter. The cognitive effort demanded by the task is evident in multiple scratch outs on students work. Students realized they were thinking along the wrong lines and then they would rewrite their thinking again. Some students had to write wrong thinking a few times before figuring out an appropriate way to solve the problem. Getting the correct answer certainly was not the aim of this task. Although many students circled their "right" answers, they were required to justify and show their methods for getting the answer.



Algebra Readiness Workshop Southeast Indiana Region

July 23 – 24, 2008

Jackson County Learning Center
1000 S. Poplar St.
Seymour, Indiana

Day One: Wednesday July 23, 2008	Day Two: Thursday July 24, 2008
8:30 – Breakfast and Registration 9:00 – Workshop Introduction 9:15 – Problem Solving Activity 10:15 – Break 10:30 – Cognitive Demand Task Sort 11:30 – Algebraic Habits of Mind Introduction 12:00 – Lunch 1:00 – Gallery Walk 1:30 – Video Analysis of Teacher Moves 2:45 – Break 3:00 – Chalk Talk Discussion	8:30 – Breakfast available 9:00 – Problem Solving Activity and Algebraic Habits of Mind Discussion 10:15 – Break 10:30 – Introduction to Questioning to Advance/Assess Student Thinking 10:45 – Student Work Analysis 11:30 – Video Analysis Introduction 12:00 Lunch 1:00 – Video Analysis of Teacher Questioning 1:45 – Modifying Low Cognitive Demand Tasks 2:45 – Break 3:00 – Lesson Planning 3:15 – Debrief

Presenters' Affiliation and Contact Information

Gina Hackman, Jennings County High School, ghackman@jcsc.org

Brenda Kendall, Scottsburg High School, bkendall@scsd2.k12.in.us

Jean Lee, Indiana University, jeanlee@indiana.edu

Dale Nowlin, Columbus North High School, nowlind@bcsc.k12.in.us

Crystal Walcott, Indiana University Purdue University Columbus, walcottc@iupuc.edu

[Kay Williams, Hanover College, willkay@hanover.edu](mailto:willkay@hanover.edu)

Indiana Algebra Readiness Initiative Regional Teams Contact List

NORTHWEST: Merrillville

Purdue University – Calumet (Academic Learning Center), August 11-12

- Marcela Perlwitz, LEAD, PU-Calumet (formerly), mperlwitz@sbcglobal.net
- Chris Dora, Highland HS, cdora@highland.k12.in.us
- Rose Dubec, PU-Calumet, rdubec@calumet.purdue.edu
- Tareg Mansour, Thorton Fractional North High School (IL), t_mansour@sbcglobal.net

NORTHEAST: Fort Wayne

Indiana University-Purdue University Ft. Wayne (Walb Student Union), July 31 & August 1

- Ronald Benbow, LEAD, Taylor University, rnborrow@taylor.edu
- Rachael Aming-Attai, IUB, ramingat@indiana.edu
- Kim Fazio, Northwood MS, Kim.Fazio@fwcs.k12.in.us
- Lisa Roberts, Northwood MS, Lisa.Roberts@fwcs.k12.in.us
- Kristy Thompson, Muncie Southside HS, kthompson@muncie.k12.in.us

CENTRAL: Indianapolis

Indiana University-Purdue University Indianapolis, July 28-29

- Dick Caulfield, LEAD, IUB, rcaulfie@indiana.edu
- Katy Dow, Pike HS Freshman Center, kdow@pike.k12.in.us
- Alice Kilbride, Brown County HS, a.kilbride@insightbb.com
- Erik Winarski, IUB, ewinarsk@indiana.edu
- Gina Yoder, IUPUI, gbyoder@iupui.edu

SOUTHWEST: Evansville

University of Southern Indiana (Health Professions Center 1079), July 30-31

- Doris Mohr, LEAD, USI, djmohr@usi.edu
- Carrie Andersen, USI, clandersen@usi.edu
- Andrea Greaney, SINE, amgreaney@usieagles.org
- Rick Hudson, IUB, hudsonr@indiana.edu
- Jane Mahan, Helfrich Park MS, Jane.Mahan@evsc.k12.in.us

SOUTHEAST: Seymour

The Community Learning Center of Jackson County, July 23-24

- Crystal Walcott, LEAD, IUPUC, walcottc@iupuc.edu
- Cathy Brown, IUB, cathbrow@indiana.edu
- Gina Hackman, Jennings County HS, ghackman@jcsc.org
- Brenda Kendall, Scottsburg HS, bkendall@scsd2.k12.in.us
- Dale Nowlin, Columbus North HS, nowlind@bcsc.k12.in.us
- Kay Williams, Hanover College, willkay@hanover.edu

ISTEM Staff

- Bill Walker, wswalker@purdue.edu
- Brandon Sorge, bsorge@purdue.edu
- Jo Crain, jo-crain@purdue.edu



Algebra Readiness Conference

June 24, 2008

University Place Conference Center
850 W. Washington
Indianapolis, IN

	BLUE GROUP	GREEN GROUP	RED GROUP
8:00-8:45	Registration		
9:00-9:45	Opening Session, Auditorium Welcome, Brandon Sorge, I-STEM Algebra in Indiana, Suellen Reed/Mike Roach, Indiana Department of Education Framing the Issues of Algebra, Diane Briars		
10:00-11:30	Cognitive Demand of Mathematical Tasks Blue 1: Room 102 Mary Lynn Raith Blue 2: Room 134 Cathy Brown	Algebraic Habits of Mind Room 137 Grace Kelemanik	Formative Assessment for Success in Algebra President's Room Diane Briars
11:30-12:30	Lunch, The Bistro		
12:30-2:00	Formative Assessment for Success in Algebra President's Room Diane Briars	Cognitive Demand of Mathematical Tasks Green 1: Room 102 Mary Lynn Raith Green 2: Room 134 Cathy Brown	Algebraic Habits of Mind Room 137 Grace Kelemanik
2:15-3:45	Algebraic Habits of Mind Room 137 Grace Kelemanik	Formative Assessment for Success in Algebra President's Room Diane Briars	Cognitive Demand of Mathematical Tasks Red 1: Room 102 Mary Lynn Raith Red 2: Room 134 Cathy Brown
3:45-4:00	Closing Session, Evaluation, & Distribution of Materials Room 137	Closing Session, Evaluation, & Distribution of Materials President's Room	Closing Session, Evaluation, & Distribution of Materials Red 1: Room 102 Red2: Room 134