

**Georgia Tech Center for Education Integrating Science, Mathematics, and Computing
Partnership (CEISMIC)**

Project Title: Atlanta Public Schools Georgia Tech CEISMIC Partnership

Project Number: 39068C3

- Lab/School/Department/Center: CEISMIC
- Report Title: Final Summary Report
- Period Covered: 07/01/2008 - 6/30/2011
- Deliverable Number: 1
- Any Publication Restrictions: None

July 1, 2008 - June 30, 2011 Project Goals and Supporting Actions

Project Goal 1: Develop a cadre of highly qualified teachers who are strong in science content and utilize best practices to deliver content. This goal is targeted at the elementary, middle, and high school levels.

Project Goal 2: Design, implement, and support professional learning initiatives that help science teachers relate subject matter content to real world applications of the content. This goal is targeted at the elementary, middle, and high school levels.

Supporting Action (s):

2009-2011 District-focused Mathematics and Science Professional Learning (DFMSPL)

CEISMIC was responsible for coordinating the science component of the Atlanta Public Schools (APS) Mathematics and Science District-focused Professional Learning (DFMSPL) event held in August, 2010 and August, 2011. Coordination included planning the agenda for all science teachers in grades K-12, conducting training for presenters, and providing and training Georgia Tech graduate students to deliver content- focused sessions. During each DFMSPL Georgia Tech graduate students planned and delivered content sessions in middle science. CEISMIC project leaders developed and wrote Georgia Performance Standards (GPS) correlated modules for each of the content focused sessions, K-8. Approximately 2000 elementary, middle, and high school science teachers per year attended science DFMSPL sessions.

Mathematics and Science Department e-learning

CEISMIC facilitated the APS Mathematics and Science Department's science professional e-learning initiative. Facilitation included designing project goals, objectives and processes, monitoring teacher participant progress, conducting any necessary training, and preparing status reports. The goals of the e-learning initiative are to increase the content and content pedagogical knowledge of science teachers in grades 3- 12. E-learning focused on teachers in grades 3-8. E-learning content was primarily delivered through the National Science Teacher's Association's Learning Center. Table 1 provides a summary of the courses completed by grade level during the 2009 – 2010 academic year.

Table 1: 2009 -2010 e-Learning Courses by Grade Level				
Grade Level	SciPack Course	APS Scope and Sequence Topic	GPS Content Standard	
3	Energy	Heat Energy	S3P1	Students will investigate how heat is produced

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Table 1: 2009 -2010 e-Learning Courses by Grade Level				
Grade Level	SciPack Course	APS Scope and Sequence Topic	GPS Content Standard	
				and the effects of heating and cooling; and will understand a change in temperature indicates a change in heat.
4	The Nature of Light	Light and Sound	S4P1	Students will investigate the nature of light using tools such as mirrors, lenses, and prisms.
5	Chemical Reactions	Chemical and Physical Changes	S5P1	Students will verify that an object is the sum of its parts.
6	Oceans Effect on Weather and Climate	Meteorology - Climate and Weather	S6E4	Students will understand how the distribution of land and oceans affects climate and weather.
7	Coral Reef Ecosystems	Ecology 1 – Interdependence of Life	S7L4	Students will examine the dependence of organisms on one another and their environments.
8	Energy	Energy and Forces – Energy in Our Life	S8P2	Students will be familiar with the forms and transformations of energy.
		Toys	S8P3	Students will investigate relationship between force, mass, and the motion of objects.

Table 2 provides a summary of project participation, achievement rates (passing), and completion rates by School Reform Team in e-learning for the 2009-2010 academic year. Completion rates were low. A focus group session was held with district model teacher letters to examine possible explanations for low completion rates. Feedback indicated more structured e-learning courses with some face-to-face contact is necessary. Therefore, the e-learning initiative is being redesigned to provide a structured e-learning course format. In order to receive professional learning units, which are provided by CEISMIC, participants will be required to complete courses within a specified nine week time-frame.

Table 2: Atlanta Public Schools Mathematics and Science Department E-learning Achievement and Completion Rates by SRT									
	Pre-test	Pre-test	Post-test	Post-test		Final			Completion
SRT	Take n	Average	Take n	Average	# taking Final Assessment	Average	# passing Final	# passing Final Average	Rate
1	180	48%	44	66%	78	75%	58	82%	32%
2	117	51%	46	61%	53	73%	37	86%	32%
3	147	46%	8	61%	26	67%	18	79%	12%
4	197	44%	2	80%	5	88%	5	88%	3%
SRT 1-4	641	47%	100	67%	162	76%	118	84%	20%

During the 2010-2011 school year participation in the e-Learning project decreased. This may have been due to several factors including changes in requirements for PLU completion by the

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professional standards commission. Appendix A provides a summary of usage during the 2010 - 2011 school year.

High School Essential Labs Academy: Biology and Chemistry

CEISMC planned and implemented two Essential Labs Academies for High School Teachers of Biology or Chemistry from June 1-4, 2010 on the Georgia Tech campus. Academies lasted from noon to 5PM each day. The purpose of the academies was to review labs teachers will be required to teach during the 2010-2011 academic year. During the academies, teachers explored background content, including real-world applications for each lab and then completed each lab. Four to six labs were completed for each content area. Twenty-one chemistry and twenty-six biology teachers participated. The instructor for the chemistry academy was Nathaniel Tindall III, a graduate student in Industrial and Systems Engineering (ISYE) and a former STEP fellow. The instructor for the biology academy was Dr. Adele Doyle. Dr. Doyle recently completed her PhD in Biology. Table 3 provides an overview of each academy's logistics and PLU information.

Table 3: Logistics/PLU Summary		
ACADEMY	Biology	Chemistry
DATES	6/01 – 04/10	6/ 01-04/10
HOURS	12:00 – 5:00 PM	12:00 – 5:00 PM
LOCATION	021 Chem Annex	L1155 Environmental Science and technology
LEAD FACULTY/PhD CANDIDATE	Dr. Adele Doyle Biology	Nathaniel Tindall III Industrial and Systems Engineering (ISYE)
# of PARTICIPANTS	26	21
PLU Total (3 per person/session)	78	63

CEISMC submitted a grant proposal to the Georgia Department of Education's Mathematics and Science Partnership program. The grant, for approximately \$232,000.00 was awarded in March of 2011. The grant focuses on the utilization of TI graphing calculators and other computational technologies into high school mathematics and physics/physical science courses. Approximately 40 APS teachers will participate in the 80 hour professional development program during July 2011 and the 2011-12 school year. Dr. Dave Goldsman in ISYE will lead the mathematics effort and Dr. Michael Schatz in physics will lead the science effort.

Project Goal 3: Increase student achievement and interest in science, technology, engineering, and mathematics (STEM) through tutoring, mentoring, summer research, Saturday, and extended day programs. This goal supports elementary schools, high school transformation and middle schools.

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Pathways into Tech is a 24-week program for juniors and seniors at the Carver, Therrell, and South Atlanta campuses. Students participating in the program are chosen because of their academic abilities and interests in pursuing a career in science, technology, engineering, and mathematics. The students meet after school on a weekly basis to attend classes and acquire skills that will translate into success at the post-secondary level.

During the 2008-2011 academic years, 120 students at each school participated in the program. In 2009 -2010 ten juniors from each of the **Pathways into Tech** schools (20 per campus) competed in the FIRST (For Inspiration and Recognition of Science and Technology) Technology Challenge (FTC). FTC is a national robotics competition designed to develop problem-solving, organizational, and team building skills. Pathways FTC teams designed, built, and programmed robots with both controlled and autonomous behavior. Pathways mentors from Georgia Tech coached the teams and helped them develop strategies to build robots based on sound engineering principles.

Senior level Pathways students focused on college selection, completion of college applications, and ACT preparation. Georgia Tech mentors acted as academic coaches to assist students to prepare for post-secondary entry. Senior level students also worked in small groups to develop an original product targeted to high school students which utilized two engineering materials. Upon completion of the product's development, they wrote a marketing plan and created promotional materials, a 3-D model, and a website for their product. Students gave presentations to administrators and parents about both their product and their experiences over the course of the semester.

In addition, both junior and senior level **Pathways into Tech** students participated in service projects in celebration of Global Youth Service Day. The students planned the projects, recruited participants, and solicited donations for the morning of service.

In 2010 and 2011, junior level Pathways students completed college tours of the following universities: Johnson C. Smith University, UNC Charlotte, UNC Chapel Hill, NC Central University, NC A&T, Clemson University, Georgetown University, Howard University and other universities in the Washington DC area.

In 2009 and 2010, eight Pathways students and two teachers from the Carver campus completed summer research experiences on the Tech campus as part of the GIFT program.

In the summers of 2009, 2010, and 2011, Georgia Tech graduate students developed and taught pre-engineering courses as part of the **Xanadu** program. Xanadu is the APS summer program for students involved in the Gifted and Talented program. Approximately 20 students participated each summer.

**Atlanta Public Schools/
NSTA Learning Center
Usage Report - By School
8/1/2010 - 5/31/2011**

School	Active Usage 8/2010 - 5/2011	Number of Licenses Purchased:	Number of Licenses Used since project started:	% Used:	Product Type: SciObject, SciPack, Book Chapter, SciGuide	Title of SciPack:
APS: Adamsville Elementary	0	10	13	130%		
APS: B.E.S.T. Middle	0	10	6	60%		
APS: Bazoline E. Usher/Collier Heights Elementary	0	10	27	270%		
APS: Beecher Hills Elementary	0	10	2	20%		
APS: Benteen Elementary	0	10	8	80%		
APS: Bethune Elementary	0	10	3	30%		
APS: Blalock Elementary	0	10	0	0%		
APS: Bolton Elementary	0	10	3	30%		
APS: Boyd Elementary	0	10	11	110%		
APS: Brandon Elementary	0	10	12	120%		
APS: Brown Middle	2	10	9	90%	SciPack; SciObject	Force and Motion; Cell Structure and Function: The Cellular Factory
APS: Bunche Middle	0	10	7	70%		
APS: Burgess-Peterson Elementary	0	10	5	50%		
APS: Capitol View Elementary	0	10	1	10%		
APS: Carver Early College High	0	10	2	20%		
APS: Carver School of Health Sciences and Research	0	10	1	10%		
APS: Carver School of Technology	0	10	4	40%		
APS: Carver School of the Arts	0	10	1	10%		
APS: Cascade Elementary	1	10	2	20%	SciObject	Ocean's Effect on Weather and Climate: Global Precipitation and

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APS: Centennial Place Elementary	0	10	11	110%		
APS: Cleveland Elementary	0	10	7	70%		
APS: Coan Middle	0	10	1	10%		
APS: Connally Elementary	0	10	15	150%		
APS: Continental Colony Elementary	0	10	2	20%		
APS: Cook Elementary	0	10	6	60%		
APS: Coretta Scott King Middle	0	10	3	30%		
APS: Crim Open Campus High School	1	10	4	40%	SciObject	Atomic Structure: Investigating Atoms
APS: Deerwood Elementary	0	10	9	90%		
APS: Dobbs Elementary	0	10	14	140%		
APS: Douglass High School	0	10	7	70%		
APS: Dunbar Elementary	0	10	3	30%		
APS: East Lake Elementary	0	10	10	100%		
APS: Fain Elementary	0	10	7	70%		
APS: Fickett Elementary	0	10	16	160%		
APS: Finch Elementary	0	10	14	140%		
APS: Forrest Hills Academy	0	10	0	0		
APS: Garden Hills Elementary	0	10	2	20%		
APS: Gideons Elementary	0	10	24	240%		
APS: Grady High School	0	10	3	30%		
APS: Grove Park Elementary	0	10	19	190%		
APS: Harper-Archer Middle	0	10	5	50%		
APS: Henry W. Grady High School	0	10	1	10%		

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APS: Heritage Academy	0	10	5	50%		
APS: Herndon Elementary	0	10	9	90%		
APS: Hill Elementary	0	10	4	40%		
APS: Hope Elementary	1	10	2	20%	Book Chapter	What Can You Learn From Fossils?
APS: Humphries Elementary	0	10	12	120%		
APS: Hutchinson Elementary	0	10	3	30%		
APS: Inman Middle	0	10	11	110%		
APS: Jackson Elementary	0	10	18	180%		
APS: Jackson High School	0	10	3	30%		
APS: Jones Elementary	0	10	6	60%		
APS: Kennedy Middle	6	10	6	60%	SciPack; SciObject; SciGuide	Force and Motion: Newton's Third Law; Properties and Changes of Properties in Matter; Atomic Structure: Properties of Atoms; Chemical Reactions: A World of
APS: Kimberly Elementary	0	10	13	130%		
APS: King Middle	2	10	7	70%	SciPack; SciObject	Resources and Human Impact; Nutrition: What Happens to the Food
APS: Lin Elementary	0	10	8	80%		
APS: Long Middle	0	10	2	20%		
APS: Mays High School	0	10	7	70%		
APS: Miles Elementary	0	10	14	140%		
APS: Morningside Elementary	0	10	8	80%		
APS: North Atlanta High School	2	10	2	20%	SciObject	Crisis; Cell Structure and Function: The Cellular Factory
APS: Other Schools	0	10	5	50%		

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APS: Parks Middle	0	10	6	60%		
APS: Parkside Elementary	1	10	17	170%	SciPack	Resources and Human Impact
APS: Perkerson Elementary	0	10	3	30%		
APS: Peterson Academy	0	10	0	0		
APS: Peyton Forest Elementary	0	10	4	40%		
APS: Price Middle	0	10	4	40%		
APS: Rivers Elementary	0	10	3	30%		
APS: Scott Elementary	0	10	33	330%		
APS: Slater Elementary	0	10	4	40%		
APS: Smith Elementary	0	10	34	340%		
APS: South Atlanta High School Computer Animation & Design	0	10	3	30%		
APS: South Atlanta High School of Health and Medical Sciences	0	10	2	20%		
APS: South Atlanta Leadership High	0	10	0	0		
APS: South Atlanta School of Law and Social Justice	0	10	0	0		
APS: Springdale Park Elementary	0	10	9	90%		
APS: Stanton (D.H.) Elementary	0	10	9	90%		
APS: Stanton (F.L.) Elementary	0	10	5	50%		
APS: Sutton Middle	2	10	7	70%	SciPack	Cell Structure and Function; Energy
APS: Sylvan Hills Middle	1	10	4	40%	SciPack	Force and Motion
APS: Tech High School	1	10	2	20%	Book Chapter	Pennies
APS: Therrell Business High	0	10	0	0		

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APS: Therrell School of Health Science and Research	0	10	2	20%		
APS: Therrell School of Law	0	10	1	10%		
APS: Therrell Technology High	0	10	1	10%		
APS: Thomasville Heights Elementary	0	10	4	40%		
APS: Toomer Elementary	0	10	6	60%		
APS: Towns Elementary	0	10	2	20%		
APS: Turner Middle	0	10	1	10%		
APS: Venetian Hills Elementary	0	10	1	10%		
APS: Washington High School Senior Academy	0	10	1	10%		
APS: West End Academy	0	10	1	10%		
APS: West Manor Elementary	0	10	4	40%		
APS: White Elementary	0	10	3	30%		
APS: Whiteford Elementary	0	10	12	120%		
APS: Williams Elementary	0	10	0	0		
APS: Woodson Elementary	0	10	9	90%		
APS: Young Middle	4	10	9	90%	SciObject; SciPack	Energy: Energy Transformations; Resources and Human Impact; Chemical Reactions: Rates of Chemical Reactions; Force and
TOTALS	24	990	651			

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IDEA: Atlanta, GA (funded by NASA Grant to NSTA)	10	50	22	44%	Book Chapter; SciGuide; Podcast; SciObject	of Light; Podcast: Scientific Method; Podcast: Overview of the 5E Learning Model; Chemical Reactions: A World of Reactions; How Do We Know What the Climate Was Like in the Past?; Here's The Crusher; Water; Podcast: Global Climate Change; Universe: The
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