Changes in WAC in Science Since 1994

Michael J. Lowry
The McCallie School
Chattanooga, TN

Science Reforms Affecting WAC

- The National Science Standards (1996) and The Next Generation of Science Standards (2013)
- Early use of writing was superficial – lab reports, reading notes, short answer prompts.
- Both of the standards documents emphasize the doing of science (science as inquiry) and stress the importance of communicating ideas in a clear, concise fashion.

Writing as a Vehicle to Support the Learning of Science

- Essay test in physics has students thinking and applying content in different ways beyond traditional abstract problem solving (see next slide)
- Writing for a wider audience than teacher. Shifting audiences requires using language suitable to that audience, further developing literacy and reinforcing content.
- Writing to demonstrate understanding shows more sophistication.

Essay Test

1. Write a letter to your parents in which you explain the scientific principles of rocketry. Include visuals where appropriate.
2. Design a comic book series for a sixth grader in which you demonstrate your understanding of rocketry. Create panels and include dialog. You may work with partners.
3. Create an original musical piece that demonstrated your understanding of rocketry. Include a written “artist statement” that interprets and explains the piece. Perform the piece.
4. Write a dialog between Isaac Newton and Wernher von Braun. In this dialog, explore the scientific principles of rocketry. Weave in elements of their life story in the dialog. You may work with partners.
5. Using only visuals (no text), demonstrate your understanding of rocketry. Write an “artist statement” that interprets and explains your piece.
6. Using only gestures and movement (no sound, no text), demonstrate your understanding of rocketry. Write an “artist statement” that interprets and explains your piece. You may work with partners.
7. Create your own option. Mr. Lowry must approve.

Focus on Developing Cognitive Skills

- Synopsis assignments require students to read about discoveries in science and write a short summary of the article. It focuses on Clear, concise prose that explains ideas to an audience of fellow students.
- Students write a letter to a legislator regarding creating new policy regarding use of ocean environments (writing for social change)

Other Writing in Science

- Metacognition - Students reflect on their own learning.
- For example, use of portfolios where students reflect back on previous work and look for patterns in their thinking.
- Authentic writing as practicing scientists communicate with each other and the broader public.

Focus of Reform Documents

Students as agents of change

not passive consumers

of science content.

Writing is the ideal tool to facilitate this process.

Jeannette Jordan, Glenbrook North HS, Northbrook, IL

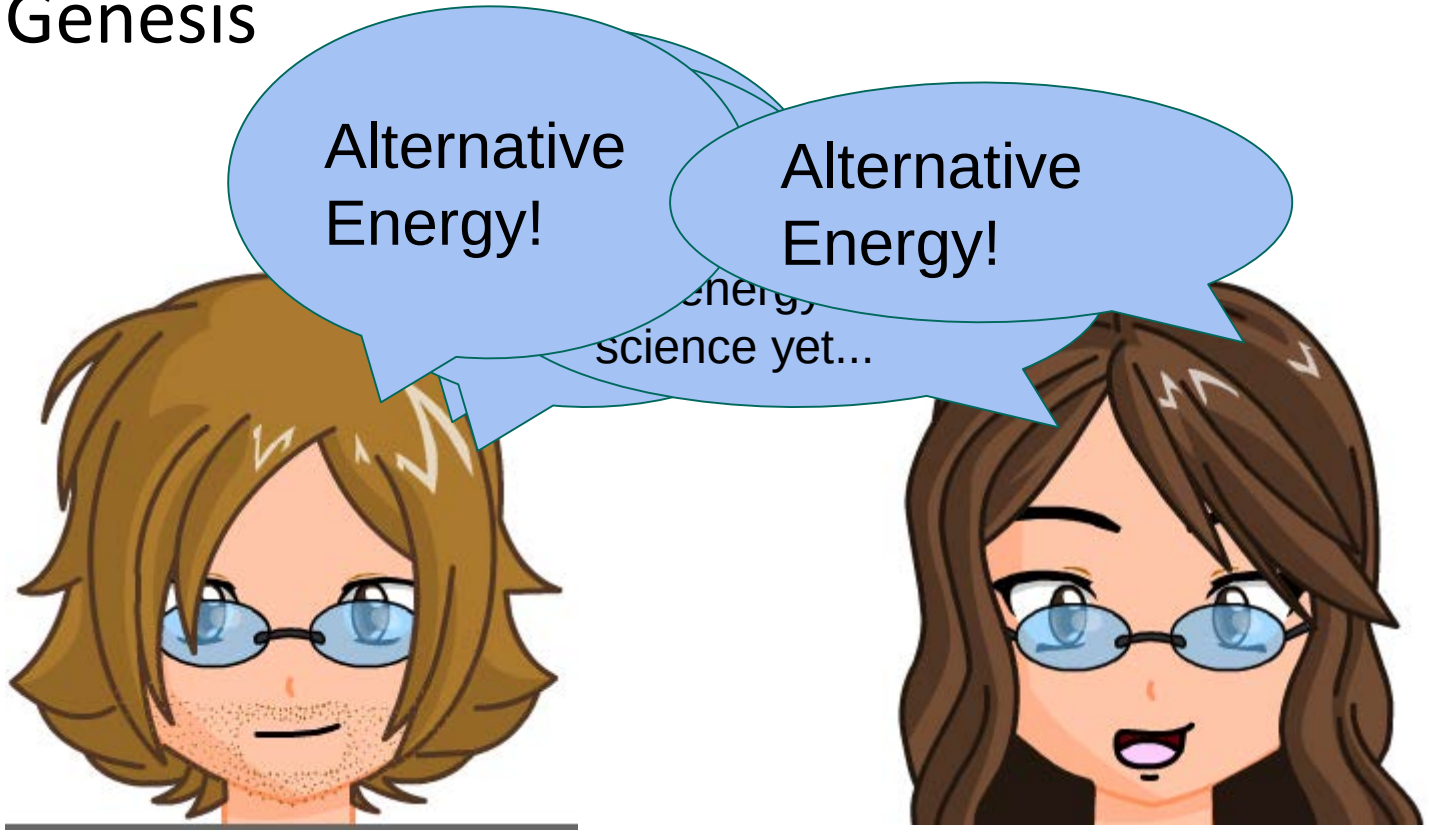
Link to video: https://www.youtube.com/watch?v=fBsm-lxWsCQ&feature=youtu.be

Getting Kids into the Tiger Stance….or something like that.

(Or, The Value of Team Teaching, WAC, and Disciplinary Literacy
)

By Melanie Dever (Mill Creek Middle School, Dexter, MI, and Ethan Konett, HS, Ann Arbor, MI

Idea Genesis



Englishy / History

Driving Questions:

What should we do to modify (change) our own behavior in order to minimize the impacts of climate change? In other words, what can we, as individuals do, to change how we use energy?

How should governments, national, state, and local, modify energy policy?

How students prepared

Credible Sources

- http://www.energy.gov/science-innovation/energy-sources
  - Many credibly links within energy sources for this site

That Produces More Energy Than It Consumes

ROOM THAT

IAN

MIEnergy Home | News | Contact Info | MI.gov

MIEnergy

Michigan Agency for Energy

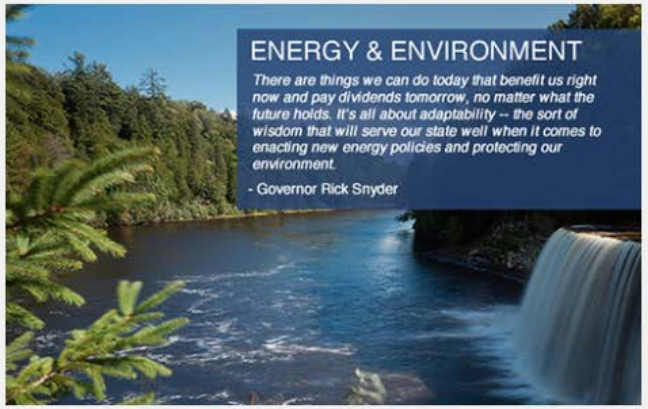
Search

ABOUT MAE | CONSUMER INFO | ENERGY POLICY REPORTS | PROGRAMS | SPECIAL TOPICS

Michigan Agency for Energy will guide state work toward affordable, reliable solutions.

The Michigan Agency for Energy's purpose is to set Michigan on a path toward affordable, reliable energy. It serves as a single entity dedicated to provide all of state government the information and context they need to support Michigan's energy priorities. Valerie Brader is its executive director, serving as the state's chief adviser regarding the development of energy policies and programs.

The Michigan Agency for Energy brings together the Air Policy Director and the Retired Engineers Technical Assistance Program from the Department of Environmental Quality; the Michigan Energy Office from the Michigan Economic Development Corporation; and the Michigan Public Service Commission. The Commission will continue to operate autonomously from the Agency.

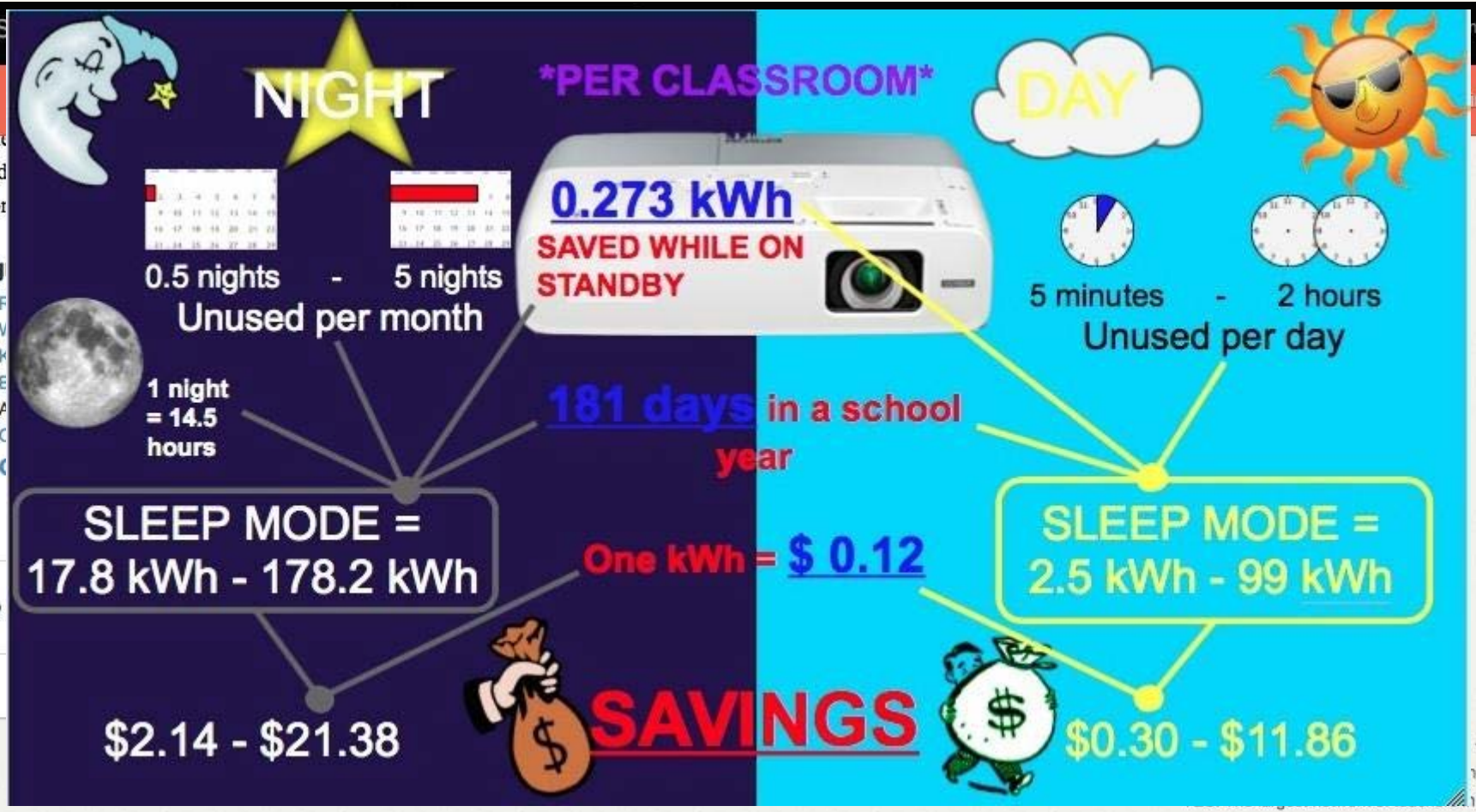


Energy Programs | **Spotlight** | **Carbon Rule**

nergy

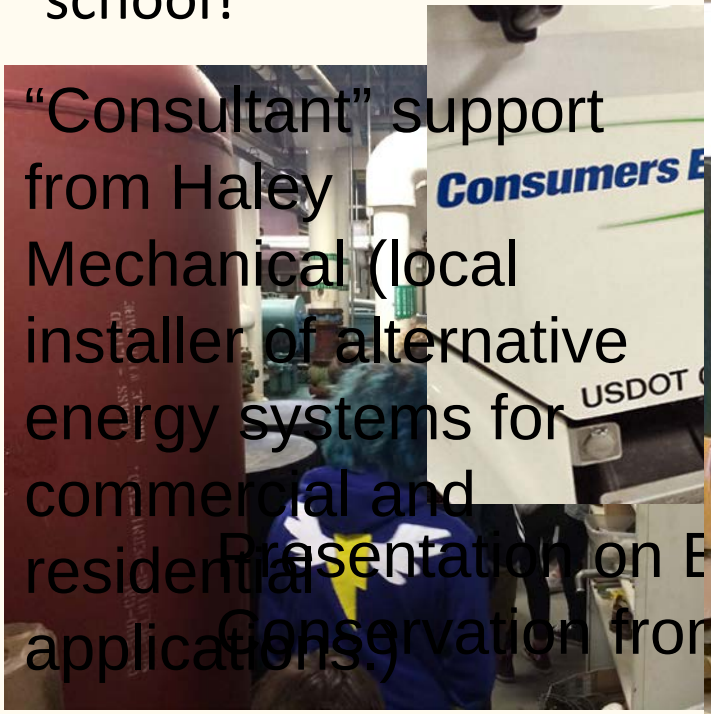
ERSON

What they created



Driving Question for Science

What can we do to reduce our energy usage at home and at school?



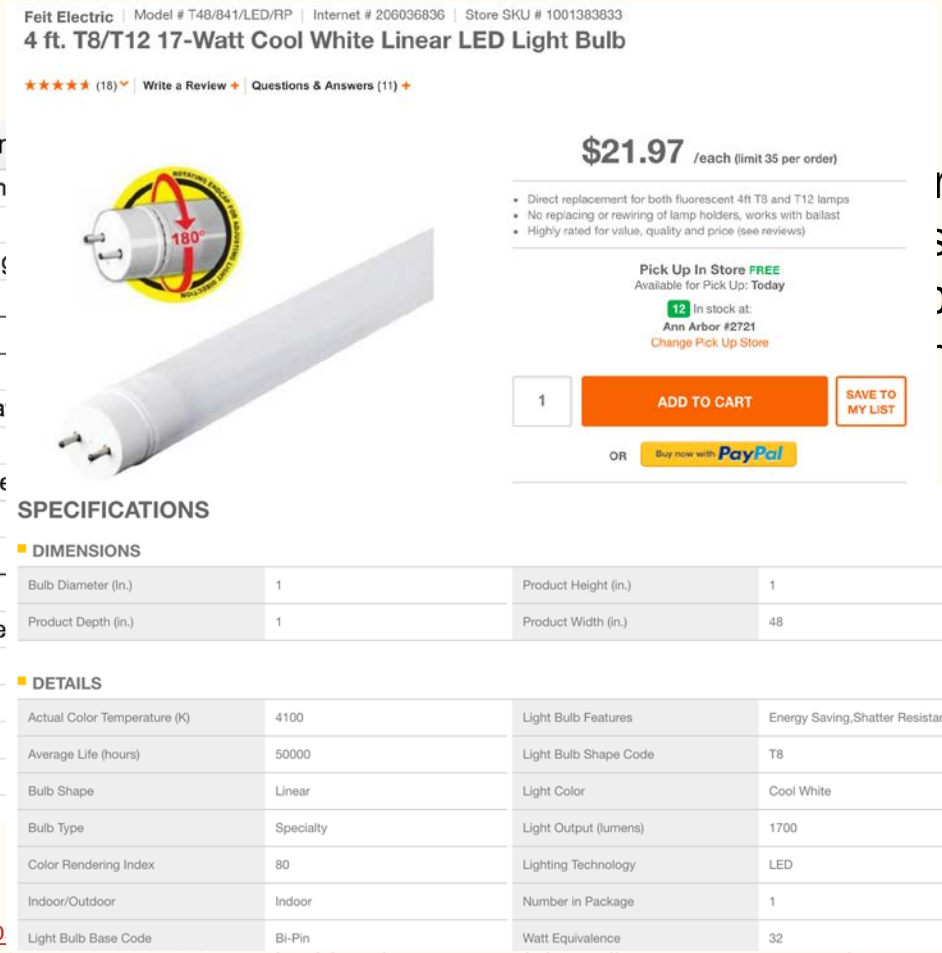
"Consultant" support from Haley Mechanical (local installer of alternative energy systems for commercial and residential applications.)

Presentation on E
Conservation fror

Literacies

Technical Product Specifications

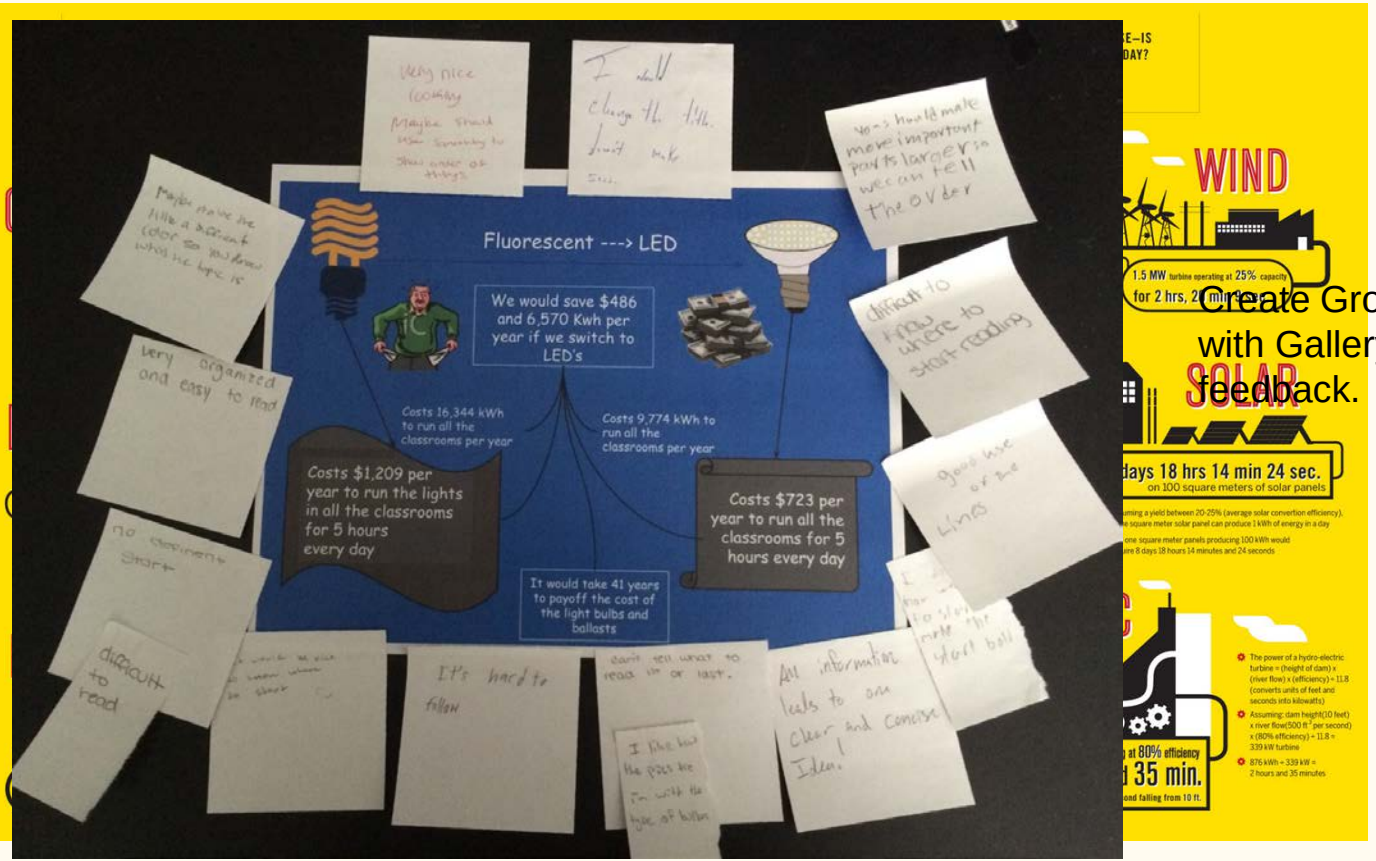
Reading Electric Met



reating and
sing a
preadsheet as an
nalysis tool.

Image Sources: https://www.flickr.com/photo dro_quebec_meter.JPG
http://www.homedepot.com/p/Feit-Electric-4-ft-T8-T12-17-Watt-Cool-White-Linear-LED-Light-Bulb-T48-841-LED-RP/206036836

Final Product for Science - Infographics



Examine and Critique existing infographics

Create Group Infographic with Gallery Walk and peer feedback.

Samples of Student Work

Switching to LED bulbs

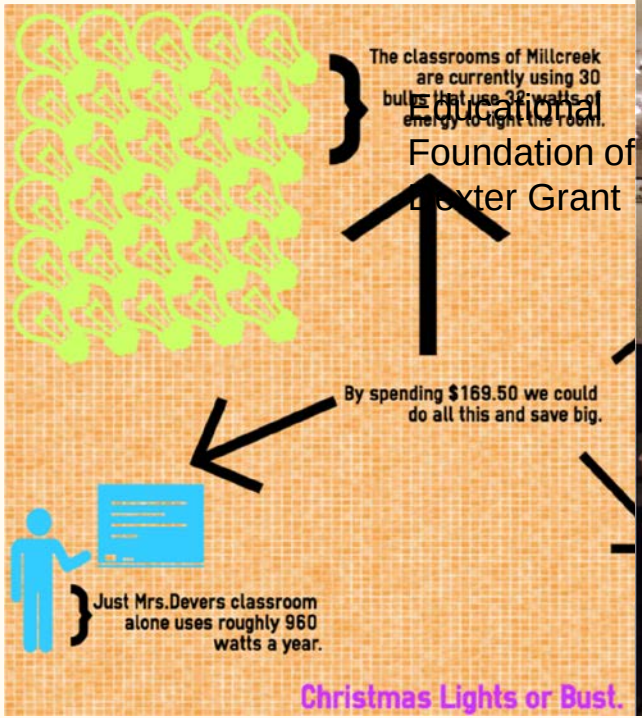
Changing Projector Settings to Auto Sleep

Individual Experiment on Turning off Lights

Proposal to Change Minimum Lighting Requirements in Classrooms

Group Website with Infographics, Spreadsheets, Reflections Blog

Ideas → Reality



Educational Foundation of Dexter Grant

The Educational Foundation of Dexter

Grant Application Form
2014-2015 School Year

Grant # (Internal use only)

The Educational Foundation of Dexter was organized in 1984 for the enrichment and benefit of the students enrolled in the Dexter School District. It is a non-profit, volunteer organization. The goal of the Educational Foundation of Dexter is to enhance excellence in education and to provide long-lasting benefits to the student and our community. Our objective is to provide financial support for innovative educational experiences and programs for students that otherwise would not be funded by the district.

Among other factors, grants are mainly evaluated by originality, quality of proposal, clearly stated objectives, cost-to-benefit ratio, references and testimonials. Please fill out the grant application form as thorough as possible keeping these points in mind.

Grant Applications are due by midnight, March 30, 2015.

APPLICANT BASIC INFORMATION:			
Applicant's Name:	Melanie Dever's Science Classes	Date:	3/17/15
School Name:	Mill Creek Middle School	Time of Year:	☐ FAL x ☐ SPRIN
Position:	Science Teacher	Type of Grant:	x ☐ STUDENT PROGRAM
Email Address:	Deverm@dexterschools.org		☐ DONOR
School Phone #	734-424-4150 x5211	Home Phone #	

GRANT DETAILS:			
Grant Title:	Energy saving LED lights & time	Is this a one-time	x ☐ Yes ☐ No
Total amount of funds requested:	$165.298	Will this have continued benefit to the students?	x ☐ Yes ☐ No
# of students served:	60 per year		
% of student body affected:	23%	Date funds are needed:	Anytime
Comments:			

OTHER FUNDING:		
Are you requesting funds from another source?	☐ Yes x ☐ No If yes, explain →	Meemic classroom makeover grant – if awarded, this grant could cover LED lights for two additional classrooms.
Amount of funds	$ 300	

WAC Today

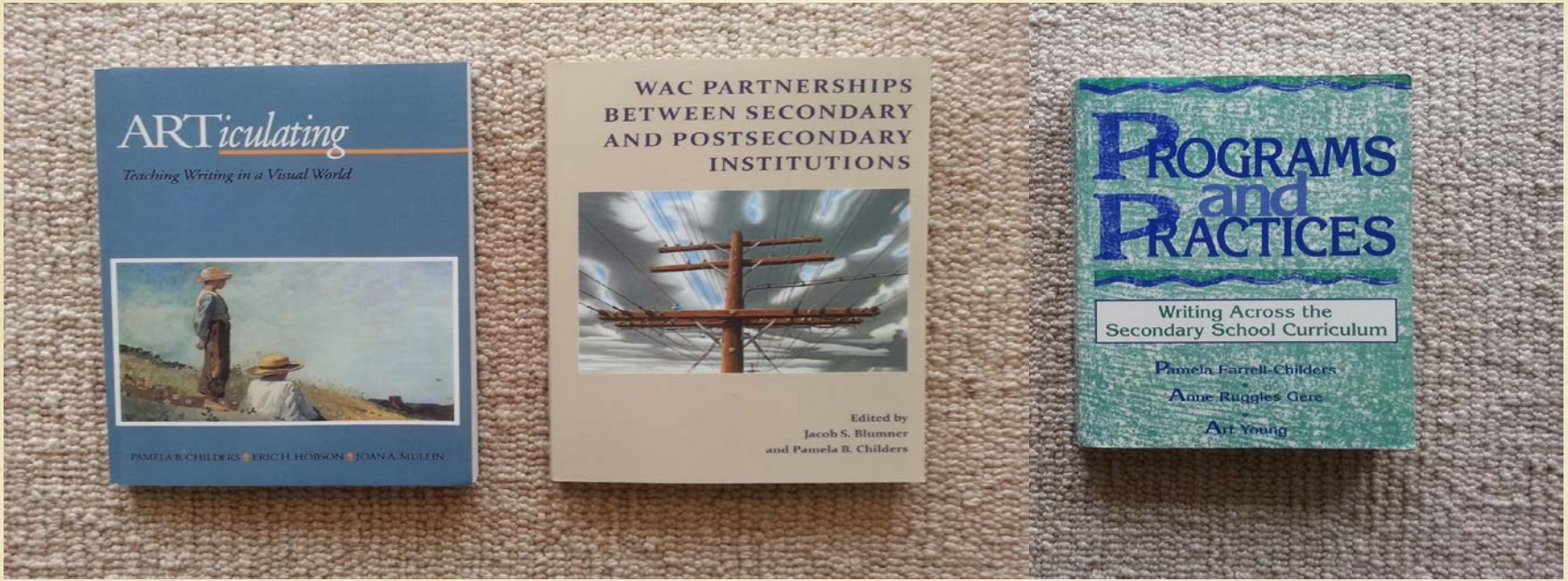
What has changed since the publication of Programs and Practices in 1994?

Pamela B. Childers

Reforms Affecting WAC

- Common Core State Standards (2010)
  - Student-centered writing activities included for all disciplines
  - Writing for a variety of audiences and collaborative writing included.
- WPA Framework for Success In Postsecondary Writing (2011)
  - Writing, reading, critical analysis
  - Habits of Mind – curiosity, openness, engagement, persistence, responsibility, metacognition, creativity
- Framework for Information Literacy for Higher Education (Association of College Research Libraries 2015)
  - Research as Inquiry, Searching as Strategic Exploration, Scholarship in Conversation, Authority is Constructed and Contextual, Information Has Value

New Perspectives Since1994



Role of the Writing Center

- Faculty interaction to design and evaluate writing assignments
- Workshops with classes on writing and research activities (MLA format, form, style)
- Individual writing conferences across disciplines (referral or drop in)
- Faculty and alumni conferences on personal/professional writing
- Faculty collaborative writing and presentations

WAC-Based Writing Center Director

- **Teaching**
  - **Poetry writing elective**
  - **Peer tutoring course**
  - **Independent study writing courses**
  - **Writing Fellows Program**
  - **Bible, Biology, American History (part-time)**
  - **Team teach Oceans Past and Present (12 years)**
- **Faculty Development**
  - **WAC Retreats**
  - **Poetry Readings for Faculty and Students with Guest Artists**
  - **Monthly voluntary faculty workshops based on *The Learning Classroom: Theory into Practice*. Annenberg/CPB Course. Linda Darling-Hammond et al. Stanford Univ., 2003.**
  - **Facilitation of writing assignments and assessment tools as well as scaffolding assignments.**
  - **Faculty guidance with further educational goals and graduate school applications and grant proposals.**
- **Community Involvement**
  - **Public relations, scholarship, promotion, other staff writing**
  - **Workshops with community organizations and businesses (Ex. law firm)**
  - **Alumni assistance with work, graduate school applications and other writing**

Individual Conferences with Students

- Referrals – English, History, Bible, Science, Economics, Art, Foreign Language
- Drop ins
  - Class writing assignments in all subjects
  - College application and scholarship essays
  - Writing contests and writing for publication
  - Writing for personal fulfillment
- Collaborative work (publication and presentation)
- Independent Studies
- Writing Fellows (beginning fall 2008)

Involvement of Writers

Peer Tutors

- Interact with student writers in all disciplines
- Offer online services and update website with materials and lessons
- Conduct research on writing in all disciplines
- Write, publish and present research on writing
- Exchange ideas and share research online and at

Writing Fellows

- Create online lessons and materials for writers and teachers, and participate in international exchanges
- Collaborate with teachers of all disciplines
- Conduct individual and class writing lessons across disciplines
- Research responding to and the teaching of writing.
- Present results of research in writing or presentation

Sample Projects

- Collaboration with science teacher on semester project to improve student reading, writing and thinking (to read, write and think like a scientist). Writing Fellows created writing assignments for progressively more difficult readings.

- Writing Fellows created an anthology of poems to use in teaching a poetry unit to 9th graders

- Peer tutors researched the kinds of writing students were doing across disciplines by grade level using Bloom's Taxonomy and Britton's modes of writing

- Writing Fellows created a 3-hour interactive

More Sample Projects

- Peer tutors and Writing Fellows collaborated on articles and chapters describing their activities and what they had learned from surveys of alumni, classes they created and taught (to students and faculty), and research they had completed.

- Peer tutors and Writing Fellows presented their WAC work at Tennessee Writing Center Collaborative 2006, IWAC 2008 and CCCC 2010.

- Independent study students created blogs, programmed music with working journals, oral reports and computer programs, short stories, poems, online forums, and published articles.

- Peer tutors and Writing Fellows led scholarship essay competitions from contacting benefactor, disseminating information, collecting essays, selecting judges to announcing

Work with Classes - 2007-2008

- Worked with 401 classes –
- Worked with the following departments:
  - English (grades 9-12 and electives)
  - History (World History, US History, Modern Middle Eastern, American West, World Issues)
  - Science (Biology, Chemistry, Physics, Oceans)
  - Art
  - Economics
  - Bible Ethics
  - Spanish

Ways of Working with Faculty

- Collaborating on creating a writing assignment and the assessment tool.
- Offering feedback on assignment or assessment tool.
- Presenting to students in the classroom or writing center.
- Reflecting on how an assignment worked and revising for the next year.

Sample Faculty Assignments

- Portfolios in Introduction to Physics (recurring assignment)
- Research PowerPoint presentations in Biology (recurring assignment) and Chemistry
- Journals modeling Darwin's diary in Biology
- Metacognitive benefits of writing in all science classes (recurring assignment)
- Research synopsis assignment in Introduction to Physics (recurring assignment)

Work with Alumni and Faculty

Alumni	Faculty
• Graduate school applications • International grant applications • Feedback on their own resumes, cover letters or creative writing • Letters of recommendation	• Graduate school and grant applications • Mentee workshops • Curriculum descriptions, proposals, letters to parents • Feedback on their own resumes, cover letters or creative writing

Team Teaching in the Sciences

- Email exchange program in Environmental Science class with secondary education majors at universities, nationally and internationally—reader response on common essays.
- Oceans: Past and Present – Senior interdisciplinary science core seminar
- Biology team lessons and collaborative presentations.

Sample Activities

- **Semester-long scientific inquiry** based on individual interests (Class developed list of questions at beginning of semester).
- **Sharing of knowledge** (Ecological interdependence collaboratively defined by class with input from scientific experts).
- **Problem solving** through role playing (*Use of Final Report of the US Commission on Ocean Policy).*
- **Reflection on Learning** (Feedback to peers on project design, evaluation of peer presentations and self-evaluation)

Connected Experiences

- **Student feedback** resulted in more collaborative-based course following guidelines and techniques of professional scientists.
- **Student awareness** of importance of the ocean on their lives and impact of their lives on the ocean.
- **Communications skills** with other scientists, peers and larger audiences through a variety of genres (NCTE, 2011).
- **Community involvement** at the local, state, national and international levels to make a difference.
- **Importance of peer review and feedback** - Reviews by a teacher and a classmate for accuracy of information, appropriate tone and language, and whether it fulfilled the assignment (Childers & Lowry, 2011).
- **Lifelong learning** - Continued connections with alumni and involvement through college and their professions as doctors, environmental lawyers, accountants, etc.

Students - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://www.mccallie.org/science/mlowry/OceansClassFolder/students.htm Go Links

Google Search 562 blocked Check AutoLink AutoFill Options

Oceans: Past and Present

Student Page

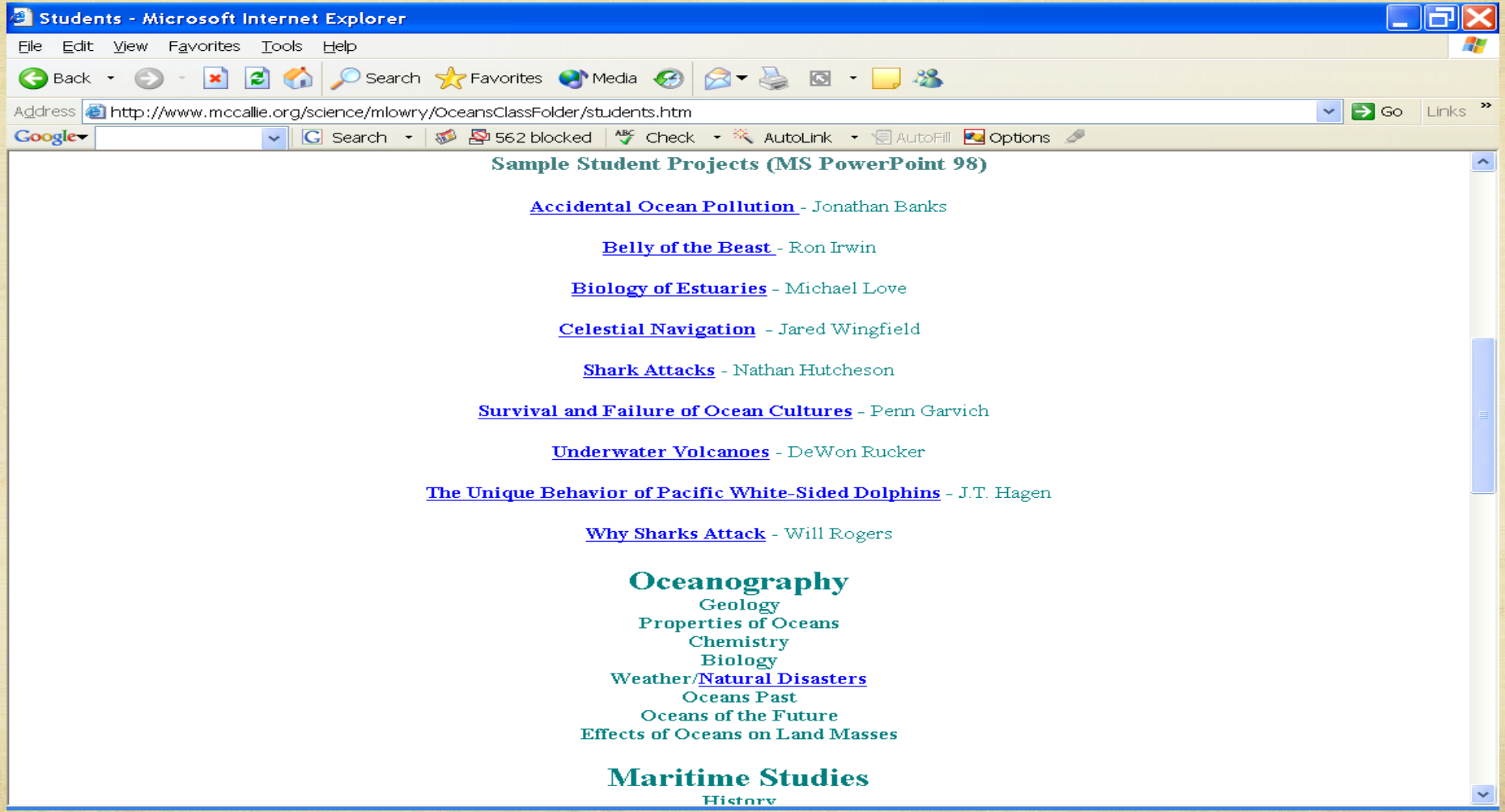
(c)2000 National Academy of Sciences

Welcome to the Oceans Student Page. Since this is your page, it will reflect your suggestions and interests. Below are possible topics of interest and a plethora of links to websites. See what you can find about some of these areas of study.

To get you started on your studies, you may want to read the course syllabus to get an overview of what we will be covering. You will be working on a project relating to Ecological Interdependence. Please go to Creature Features for your next assignment. Also, as part of our work this year, we will be using the discussion forum and other links at the Writing Studio at Colorado State University. One of our major projects this semester involves connecting the themes of Connections, Survival, and Communities through the study of *Song for the Blue Ocean* by Carl Safina. The assignments for the reading of *Song for the Blue Ocean*.

At some point during the semester, you must complete a semester project. Your instructors will be discussing this in depth during the second marking period. Since this will be a totally new assignment quite different from ones in previous years, you will be involved in the design of the project.

Finally, you may want to check the website of the Bermuda Biological Station for Research for specific educational studies. Below are listed some areas of interest for this course and suggested research links. This list includes presentations done by students.


Students - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address http://www.mccallie.org/science/mlowry/OceansClassFolder/students.htm
Go Links
Google Search 562 blocked Check AutoLink AutoFill Options
Sample Student Projects (MS PowerPoint 98)
Accidental Ocean Pollution - Jonathan Banks
Belly of the Beast - Ron Irwin
Biology of Estuaries - Michael Love
Celestial Navigation - Jared Wingfield
Shark Attacks - Nathan Hutcheson
Survival and Failure of Ocean Cultures - Penn Garvich
Underwater Volcanoes - DeWon Rucker
The Unique Behavior of Pacific White-Sided Dolphins - J.T. Hagen
Why Sharks Attack - Will Rogers
Oceanography
Geology
Properties of Oceans
Chemistry
Biology
Weather/Natural Disasters
Oceans Past
Oceans of the Future
Effects of Oceans on Land Masses
Maritime Studies
History

Class Discussion Forums - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://writing.colostate.edu/classes/forum/ Go Links

Google Search 562 blocked Check AutoLink AutoFill Options

Forums for the Entire Class

Definition of Ecological Interdependence

Description: As a class, we came up with the following definition after four drafts. This is now our working definition: Ecological interdependence is a biological balance of interrelationships, both biotic and abiotic, within an environment in which components depend on one another for self preservation. Find a credible science resource at a college or university and ask them what they think of our class definition. Share their response with us on this forum, making sure that you have the person's full name, title, college/university, and email address. Also, please respond as to whether the person's critique is viable and how you might revise the definition based on his/her input. If you are having trouble finding a credible source, please check with one of your teachers. You will have two weeks to respond to this assignment on the forum. Dr. Childers and Mr. Lowry

Project Evaluation

Description: Please post your answers the following questions in as much detail as possible. We truly want your feedback. Thanks. 1. What did I learn from the_Song of the Blue Ocean_ project? 2. What did I like best? 3. How could we improve this project? 4. Any other suggestions or comments.

FINAL DEFINITION OF ECOLOGICAL INTERDEPENDENCE

Description: As a class, we determined that our revised definition of ecological interdependence would be the following: Ecological interdependence refers to the interactions between species as well as the interaction of species with their environment that results in food making, food taking and evolution. This study of science and language, involving research and critical feedback from scientific experts, evolved during the semester. If you have any comments or suggestions on the progression of the definition, please give us some input. Thanks, Dr. Childers and Mr. Lowry

Semester Evaluation

Description: Our themes for this semester were Connections, Survival, and Ocean Communities. Please give us feedbak to the following questions. Thank you. 1. What are the strengths of this course? 2. What did you enjoy most and why? 3. What suggestions do you have for the course next year? Please also respond to the self-evaluation in an email message to pcchilder@mccallie.org and mlowry@mccallie.org.

Self-Evaluation

Description: In an email to us, evaluate your own learning in relation to this course. You should definitely mention specific ideas or concepts that you learned in relation to the ocean and humans, but you may also mention other things that you have learned about learning. Please conclude with an evaluation of your learning in this class. That is, give yourself a grade for the semester and justify it. This is a real chance to write an effective piece that is persuasive! We DO read and consider your evaluation with our own. Happy Holidays!

Tutors and Fellows Present

Writing Across the Curriculum: Writing in the Humanities

Nolan Boyd

Process

- Email request to interview teachers from a variety of subjects
- Teacher interviews about writing assignments
- Results of data analysis:
  - Most prevalent purposes
    - To demonstrate knowledge and analysis of literary text
    - To have students examine their own belief systems
    - To learn how to do research.
  - Most prevalent skills involved:
    - Literary analysis
    - Content specific knowledge
    - Research
  - Most prevalent assessments
    - Subjective teacher evaluation
    - Project specific grading considerations / evaluations / rubrics

Class Specifics

- Subjects - # of classes
  - English – 4
    - 9th grade English
      - Application; Analysis
    - Search for a Perfect Society – 12th grade
      - Evaluation; Synthesis/Evaluation
    - AP English Literature – 11th grade
      - Analysis
    - American Studies (with history department) – 11th grade
      - Synthesis/Evaluation
  - Bible – 4
    - Biblical Ethics (2 classes) – 9th – 11th grade
      - Class 1: Analysis
      - Class 2: Comprehension
    - Introduction to the Bible – 10th grade
      - Analysis
    - Seminar on Christian Thought – 9th – 11th grade
      - Application/Analysis

Class Specifics (cont.)

- Foreign Language – 2
  - AP Latin – Vergil – 11th and 12th grade
    - Analysis
  - AP Spanish Literature – 12th grade
    - Analysis
- History – 1
  - American Studies (with English department) – 11th grade
    - Synthesis/Evaluation
- Marketing – 1
  - Seminar in Marketing and Advertising – 12th grade
    - Application/Analysis/Synthesis
- Art – 1
  - Art Foundations – 9th – 12th grade
    - Analysis/Synthesis

Conclusions

- Majority of assignments: literary analysis
  - Also: the research paper; essays expressing students' own beliefs
- Either subjective teacher evaluation or more structured, clearly outlined grading criteria
  - Grading criteria applied to varied assignments.
- Bloom's Taxonomy Categories
  - Majority Analysis
  - Synthesis and Evaluation prevalent in 11th and 12th grade courses

Writing Across the Curriculum: Writing in the Sciences

Reid Alexander

Research

Process

- Gathering data
- Contacting teachers
- Interviews
- Spreadsheet
- Analysis

Interview Questions

- What was the purpose of the assignment? Why did you give it? Did you have certain expectations of responses?
- Why or how did you select this particular grading criteria?
- Do students work on any part of this assignment in class? If so, which part?

Underclass Courses

- Honors Biology
- AP Biology
- Biology
- Chemistry
- Introduction to Physics

Senior Courses

- Oceans Past and Present
- Bio-Ethics
- Human Genome

Underclass Assignments

- Often require collaboration
- Work the scientific process
- Encourage growth
- Prepare for a test
- Use some open-ended prompts

Senior Assignments

- Real world application
- Effective communication
- Critical analysis
- Require abstract thinking
- Mostly open-ended prompts

Qualities of Assignments

(Based on Bloom's Taxonomy)

Underclass Assignments

- Comprehension
- Application
- Analysis

Senior Assignments

- Evaluation
- Synthesis

Excellence in K-12 WAC Series

- Offers educators of all academic levels an opportunity to partner on topics such as teaching writing in all disciplines, administration of WAC programs, WAC partnerships, ESL, curriculum development, writing/learning centers, NWP, other literacies, standardized tests, assessment, etc.
- Provides outstanding reviewers who are experienced K-12 teachers and writers across disciplines as well as university undergraduate and graduate educators involved with K-12 teachers
- Opens new doors of exploration for both writers and readers

Newest WAC Project

- New research and book project called *The Road Taken: Writing Journeys from Secondary School Through Diverse Careers*
- Each of 16 authors (8 from Red Bank Regional and 8 from McCallie School) will tell the story of the role of writing in their lives from high school to today. None is a professional writer.
- Ages of authors range from 20s – 50s

Sources

- Alexander, Reid and Nolan Boyd. 2008. “Writing in the Sciences on the Secondary and College Level: Is There a Connection?” Paper presented at the annual meeting for the International Writing Across the Curriculum Conference, Austin, TX, May 16-18.

- Augustine, Arun, and Philip McGill. Summer 2009. “Writing Fellows are More Than Tutors.” *Southern Discourse: Publication of the Southeastern Writing Center Association.*

- Baker, Wils et al. Summer 2007. “Independent Studies in Writing Based in the Writing Center.” *Southern Discourse*: *Publication of the Southeastern Writing Center Association*.

- Childers, P.B. & Lowry, M. J. (2012). “STEMing the Tide: Writing to Learn in Science.” In Lennex, L.C. & Nettleton, K. F. (Eds.). *Cases on inquiry through instructional technology in math and science*. Hershey, PA: IGI Global. 21-50.

- Childers, Pamela et al. 1998. “Developing a Community in a Secondary School Writing Center.” In *Weaving Knowledge Together: Writing Centers and Collaboration*, edited by Carol Haviland et al. NWCA Press.

- Davis, Martin H., III, and Pamela Childers. Summer 2006. “Practicing What You Preach: A Collaborative Column.” *Southern Discourse*: *Publication of the Southeastern Writing Center Association*

Sources

- Gere, A*nne* Ruggles. *Policy Brief on Reading and Writing Across the Curriculum.* Retrieved from http://www.ncte.org.

- Grant, T, Murphy, A., Stafford, B. & Childers, P. (1997). "Peer Tutors and Students Work with Formative Assessment." *The Clearing House*, 71(2), 103-105.

- Hines, James et al. 2010."Redefining University Models for Classroom-based Writing Fellows in Secondary Schools." Paper presented at the annual meeting for the Conference on College Composition and Communication, Louisville, KY, March 17-20.

- Mooney, Davis et al. Fall 2010. "The Value of Indirect Classroom Teaching." *Southern Discourse: Publication of the Southeastern Writing Center Association*.

- Mullens, David. 2008. "Overexposure of Violence in Our Society." In *Contemporary Reader*. 9th ed., edited by Gary Goshgarian. 233-238. New ork: Pearson.