A Place-Based Model for
K-12 Education in Tennessee

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Introduction

Place-Based Education (PBE) occurs when children, teachers, and adults in the community use the social, cultural, and natural environment in which they live as an inquiry-based learning laboratory for K-12 students to gain knowledge and skills across the curriculum (Sobel, 2005). Tennessee's rich cultural heritage, ranging from the Scot-Irish of the eastern highlands to the people of the Mississippi Plains, provides an excellent backdrop for student inquiry into the social and cultural environment of the state. With nine eco-regions, Tennessee's aquatic, amphibian, and plant diversity is the highest of all inland states making Tennessee number five overall in total biodiversity (Stein, 2002). In fact, the aquatic diversity in the Duck River, Tennessee's longest free flowing stream, has more fish species than all of Europe (Stein, et al, 2000). This dynamic outdoor laboratory is well-suited for Place-Based Education and for using Tennessee's natural environment as a laboratory for learning across the curriculum. With Place-Based Education, students can learn more about the natural world in which they live than they do about rainforests and deserts. Learning about the natural world and the streams, watersheds and eco-regions in which they live can also increase student's sense of place, self-identity, regional pride, and conservation ethic.

A Place-Based curriculum fundamentally changes the traditional curriculum framework and, thus, the culture in which children learn. The PBE framework shifts the educational system from an outdated industrial input-output linear model to the more dynamic interdisciplinary approach of the information/digital age based in action research. In the Place-Based Model, the goal is to create opportunities for students to think independently (inquiry), collect, analyze, synthesize, and critique information (data), address community opportunities and concerns, and create knowledge and innovative ideas. Another major goal Place-Based Education addresses is the communication skills. In PBE students develop communication skills by reporting their research findings through publications (written and electronic) and presentations to their peers and the community. If environmental and social data students collect in their communities is standardized, it can be uploaded by students across the state into a data network on the web which can be coordinated through school libraries and their information services and the Tennessee Library Association. They can then do research on social and environmental concerns across a large geographic area including community comparisons. If other states do this, they can become involved in national studies as well. A model for this approach would be the "USA National Phenology Network." The Network brings together citizen scientists, government agencies, non-profit groups, educators and students of all ages to monitor the impacts of climate change on plants and animals in the U.S. Students can gain skills and experience using technology to conduct field assessments, analyze data, prepare presentations, and communicate results to others. Combined, these activities form the basis for

"authentic" education, which connects students and teachers directly to the world beyond the classroom walls.

In the traditional learning model, as exemplified by Socrates, teachers are the holders of knowledge and skills which are passed on to their students (Figure 1). In today's world, with knowledge and skills constantly evolving, students need to learn both content and process skills, including the skills and commitment to be lifelong learners. To be lifelong learners, students need to be grounded in inquiry, which is about process or "how to think." When the inquiry approach is fully implemented, however, the result will be growth in knowledge and skills (content). As inquiry is internalized as a way of thinking, students then have the basis to become the thinkers and scientists of the future, particularly in science, technology, engineering and math (STEM). Ultimately it is about learning, discovery, and engaging (Figure 2) or as described in the traditional land-grant university model – teaching, research, and service (Hollander and Saltmarsh, 2000).

In the Place-Based Model, everyone is a learner (Figure 3). This calls for a cognitive shift in how teachers perceive themselves in the learning environment. It frees them to be collaborative-learners with the students and partners in the community. They no longer feel the need to "know it all" or teach only "what they know." Their role is to be a facilitator of learning and a co-learner. This approach is advantageous because it removes the artificial barrier between students and teachers that is created when teachers are viewed as the "power holders" and "dictators of knowledge." Place-Based Education creates an environment that fosters more genuine relationships between teachers and students. The challenge in this approach may be finding ways to help teachers embrace this fundamental shift in what teaching really means. Spencer Johnson's book, *Who Moved My Cheese?* provides a good starting point.

Figure 1. Traditional Learning Model

Teachers → Students

Knowledge/Skills
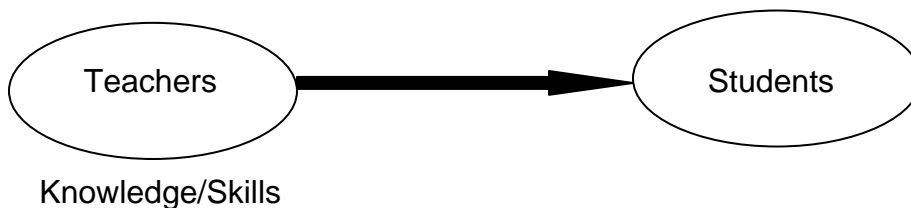
Figure 2. Inquiry/Active Learning Model

Learning, Discovering, Engaging

Teachers, Students, Community
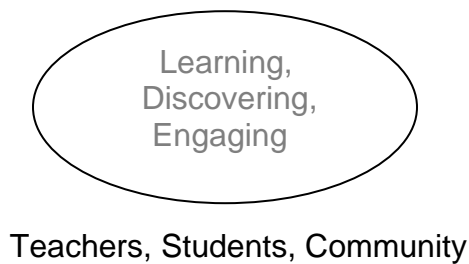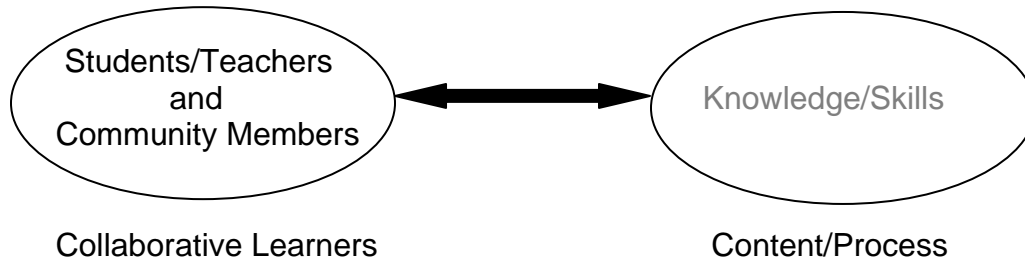
"Whenever we teach a child something, we take away the opportunity for them to invent it on their own."
                    Jean Piaget

"The main idea of inquiry is for students to learn in the same way scientists learn— through research (Bio2010)."

Figure 3. Place-Based Learning Model

A version of the Place-Based Model has been used very successfully since 1971 at Evergreen State College, an acclaimed liberal arts college in Olympia, WA (http://www.evergreen.edu/about/curriculumoverview.htm). Evergreen's philosophy includes "The Five Foci of Learning" (http://www.evergreen.edu/about/fivefoci.htm) that are directly applicable to the K-12 environment.

They are:

Interdisciplinary Study: Students learn to pull together ideas and concepts from many subject areas, which enables them to tackle real-world issues in all their complexity.

Collaborative Learning: Students develop knowledge and skills through shared learning, rather than learning in isolation and in competition with others.

Learning Across Significant Differences: Students learn to recognize, respect and bridge differences, which are critical skills in an increasingly diverse world.

Personal Engagement: Students develop their capacities to judge, speak and act on the basis of their own reasoned beliefs.

Linking Theory with Practical Applications: Students understand abstract theories by applying them to projects and activities and by putting them into practice in real-world situations.

Furthermore, Evergreen states their graduates do well because working on real multidisciplinary problems better prepares students for jobs and graduate school and the complexities of the real world. (http://www.evergreen.edu/about/graduates.htm) Examples and research showing the effects of place-based programs in the U.S. may be found at: http://www.peecworks.org/PEEC/Benefits_of_PBE-PEEC_2008_web.pdf
http://www.peecworks.org/PEEC/PEEC_Reports/
http://www.peecworks.org/PEEC/PEEC_Research/

The Engaged Student

Students who are actively engaged in learning are listening, speaking, and openly discussing and critiquing ideas in a sometimes competitive, but otherwise friendly and supportive environment. When considering Bloom's diversity of learning styles, active or kinesthetic learning, may be the one area we fail to address the most in the traditional curriculum. While both genders would likely benefit, research on gender differences may suggest boys would benefit the most. The engaged student takes "responsibility for their own learning" just like they do in recreation and play. Therefore, students are more prepared for a career of "lifelong learning," which can be more important than having a career field. In PBE, students are involved in real world activities with authentic applications and consequences. Their learning activities create relevance and meaning in their lives. Students sometimes work individually, but more often in teams of teachers, students and adults in their communities. This community learning environment further breaks down the "us" vs. "them" roles of students and teachers into a collaborative learning environment, resulting in cognitive and emotive growth for all.

Competency-Based Learning

Competency-Based Learning, or what Bloom refers to as Mastery Learning Theory, is based on the "continuous improvement model" in industry, where immediate assessment, feedback and re-assessment are used to improve performance and achieve "excellence." It is based on Bloom's four hypotheses (McCabe, 1997).

<div align="center">

Bloom's Hypotheses:

</div>

(1) "A normal person can learn anything that teachers teach."
- Time is a limiting factor.

(2) "Individual learning needs vary greatly."
-Using a variety of learning techniques will enhance learning for students.

(3) "Uncorrected learning errors are responsible for most learning difficulties."
-Evaluation, feedback, and re-evaluation (repetition) are keys to learning.
(Repetition is a basic psychological precept in learning theory)

(4) "Under favorable learning conditions, the effects of individual conditions approach a vanishing point, while under unfavorable learning conditions, the effects of individual differences are greatly exaggerated."

Bloom's Hypotheses lead to the following questions:

- Is lack of student success attributable to the lack of student ability or the lack of a favorable learning environment?

- What do we fundamentally believe about the ability of people to learn?

- How does this belief lead to our approach to teaching and learning?

In the traditional model, a student proceeds through a course and receives a final grade (Figure 4). Students, however, start a course with different levels of proficiencies or starting points and progress through the course to their final grade (Figure 5). In Figure 5, Student 2 learned more, perhaps even worked harder, but Student 1 received the highest grade, an "A." Figure 4, the traditional method, does not show starting points or how much the student learned over the school year, as is shown in Figure 5. How do we reward the learning effort or work of Student 2? How do we ensure all students progress to a higher level of competency and as many as possible progress to a level of excellence as shown in Figure 6? How can we help the "C" student become an "A" student? How do we define competency?"

If Bloom's hypotheses are true, we need to change the learning environment. Implementing Place-Based Education with the Competency-Based Model Evaluation model described below would be a significant shift in the learning environment with the potential to reach a point where the effects of individual learning conditions start to vanish (Hypothesis 4).
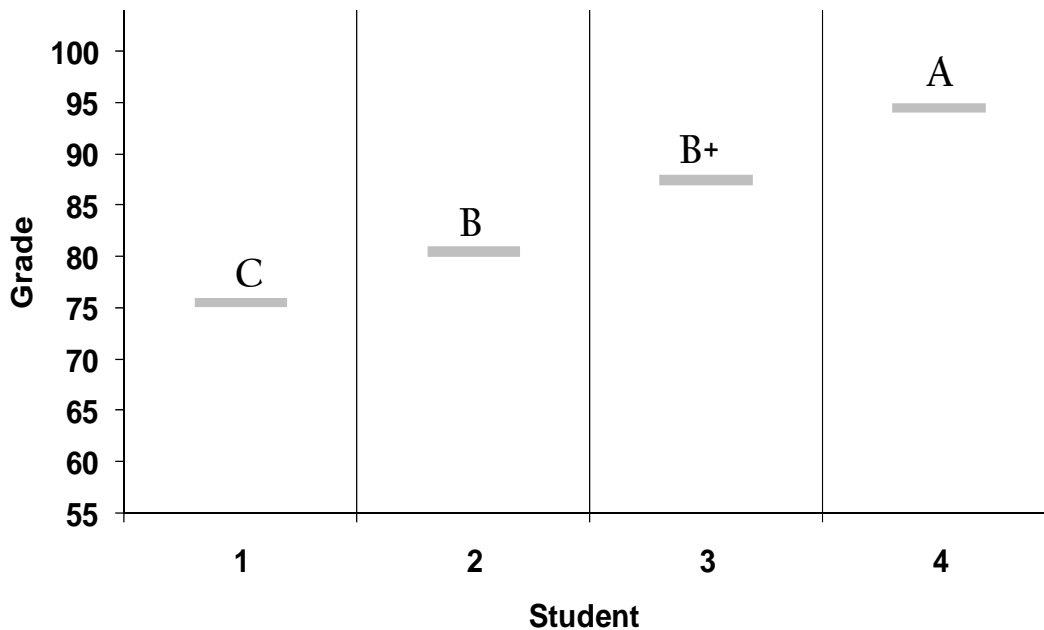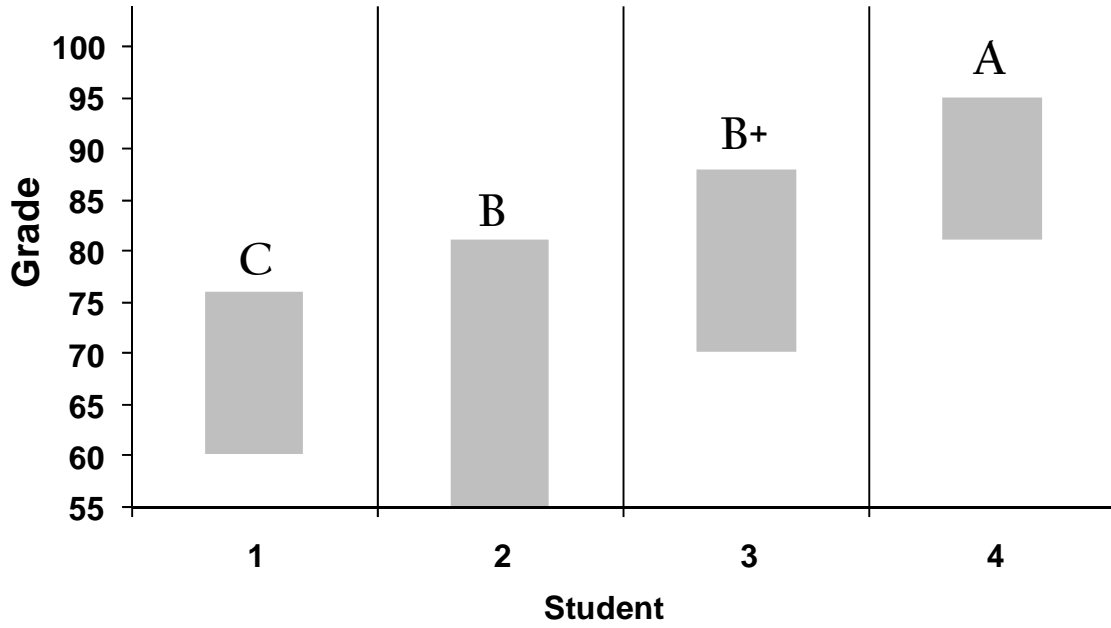

Figure 4: End-of-Year Grade

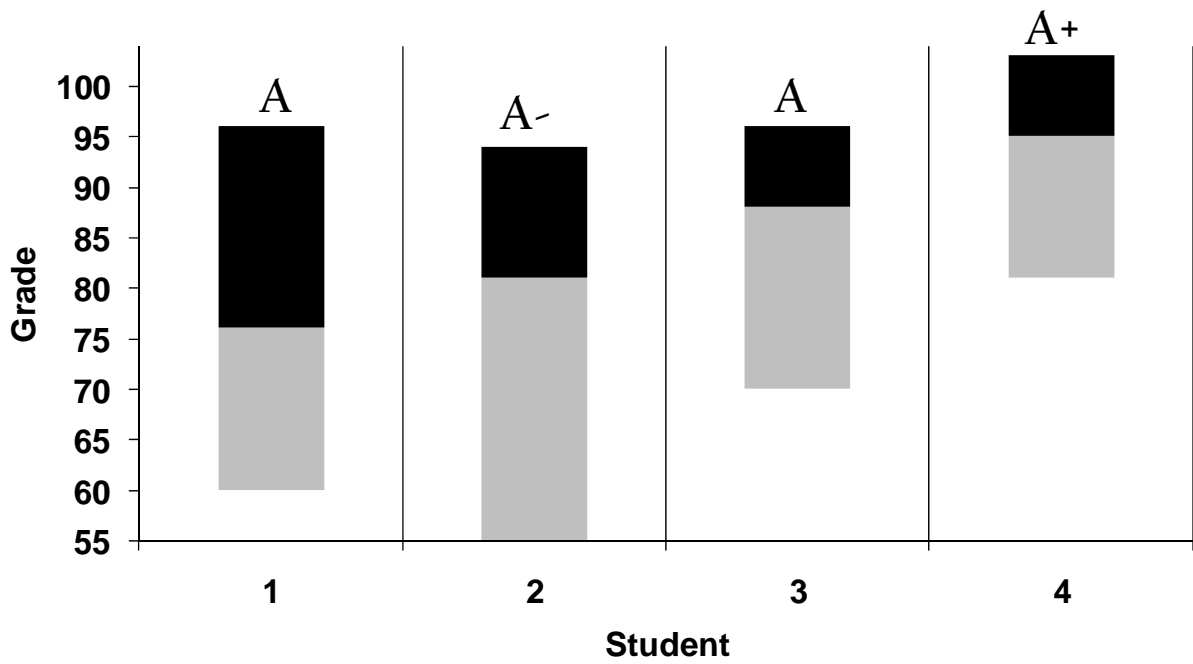**Figure 5: Learning Growth from the Beginning to the End of the School Year**

Figure 6: Added Value Using Competency-Based Evaluation

Evaluation of Student Performance: A Competency-Based Evaluation Model

Evaluating the results of Place-Based Learning can be achieved by two methods. The first is traditional standardized testing. Place-Based learning models that use the community in which children live as a learning laboratory across all subjects, have been demonstrated to improve student performance on standardized tests (See sources). A likely reason for better performance is that Place-Based Learning engages student curiosity in an authentic, action-based learning environment. It is reminiscent of childhood curiosity and creativity and the reason children play with boxes rather than the presents in the boxes. The boxes allow for two fundamental elements of play in its purest form – imagination and manipulation. These two fundamental elements of play form the basis for learning (in its highest form) and scientific inquiry. Nature, as a play and learning environment, has the same intrinsic elements as boxes and much more. It engages all the levels of imagination and manipulation, from the inquisitive pre-school child to the deepest levels of scientific inquiry. Nature presents real-world content and hands on challenges that engage student interests across all subject matter and the best scientists, mathematicians, engineers, inventors, historians, philosophers, theologians, writers, and literature of the world.

A second evaluation method is the Competency-Based Model. In this model, a set of core competencies are identified that students are expected to achieve by the end of secondary school to be ready to move into college, the work force, a year of National Service (see Service Learning), or the work force. The next step is to work backward with interim competency levels to the first year of middle school, or even to kindergarten. While these core competencies will need to be linked to knowledge and skills represented in the standardized tests, they can go beyond performance on a test and directly show demonstrated achievement through a student's portfolio. Portfolios can document actual accomplishments with examples of student work and employee style evaluations including narratives written by faculty and mentors. Self-evaluations are written by students as well. A portfolio is more personalized than a number on a standardized test or a grade on a transcript and can easily be shared with friends, family, employers, and colleges. A version of this model has succeeded at Evergreen State College. (http://www.evergreen.edu/about/graduates.htm)

 With a Place-Based Learning System and a Competency-Based Evaluation Model (CBEM) school systems can move toward reaching designated goals in all aspects of the curriculum, including science, technology, engineering and math, while nurturing an engaged citizenry and the scientists of tomorrow. The Competency Model can be used within traditional grades, but perhaps more successfully across grade levels or even in a "non-grade level system." It can work in a similar manner to vocational education classes where once a student demonstrates mastery of a specific skill set (perhaps while participating in a community environmental restoration "service learning" project), they are ready to move on to the next learning task.

Service Learning

Service Learning is an integral part of Place-Based Education. Place-based inquiry involving interactions of a community's social and natural systems is especially conducive to service learning. After students indentify an issue and delve into underlying causes, they are in a good position to communicate how the community may contribute to the issue and how it could make beneficial changes. For example, students may discover that a stream near their school is polluted with silt, fertilizers, and pesticides. Exploring land use upstream, they may discover subdivisions or farms that are not adequately controlling storm water runoff. They are then equipped to make presentations to the community pointing out the results of improper control of runoff and the need for voluntary action to put better controls in place. This component challenges students to refine and express what they have learned to audiences outside the school. The challenges of synthesizing their findings into effective forms of public communication require them to boil data down to a coherent, persuasive message. The result of this process can be a powerful sense that what they have learned can make a real difference in their world.

With Place-Based Education that includes Service Learning, students are more likely to be prepared cognitively and emotionally to move into the workforce or to a college major and a career choice. If the last year of secondary school (after competency is achieved) is a National Service Year, similar to the Peace Corps, then students may be prepared to complete a Bachelor's degree in three years and a Professional Master's degree in four years. Students following a research scientist track would be able to finish a B.S. and an M.S. in a minimum of five years. Ideally, the Service Year would be an apprenticeship in the student's career field doing research, or in community service, business, education, etc. Students in the research tract would be better prepared after their research experience in Place-Based Education. Students interested in other fields, such as education, would be expected to use their Service Year to teach in the very Place-Based programs in which they were trained. These students would become an integral part of the implementation and success of the Place-Based Education Model.

Application to STEM

A few examples of ways a Place-Based Learning System, coupled with a Competency-Based Evaluation Model, can be applied in science, technology, engineering, and math education are listed below. Actual projects would cover all elements of traditional curricula and include the social, cultural, historical, and ecological features of student communities as well as the humanities.

Science
- Study the local food chain and develop methods for supplying food to groceries and restaurants (food sustainability).
- Apply knowledge of ecological systems to issues of community sustainability.
- Conduct wildlife habitat evaluations.
- Inventory urban trees and develop a management plan for urban forests.

- Develop forest management plans for private landowners who want to meet sustainability standards for forest certification.
- Study local tick populations, such as species distribution and disease prevalence, and partner in research with the Center for Wildlife Health in the Department of Forestry, Wildlife, and Fisheries at The University of Tennessee.
- Use social science research methods to measure social capital in the community.
- Determine the ecological footprint of the community.

Technology
- Use increasing complex technology (instruments and computers) to do data collection and environmental analysis, such as research in microbiology (pathology) and DNA studies.
- Develop the capacity to repair computer in schools.
- Use GIS to do spatial analysis on urban trees and in conservation planning.
- Use a CAD system to plan school yards, outdoor classrooms rooms and parks.

Engineering
- Use bio-systems engineering in ecological restoration projects.
- Develop energy conservation plans for the community.
- Develop more efficient community transportation models.
- Partner with TDEC's TP3 Green Schools.
- Research and make recommendations on waste management in the community.

Math
- Apply econometrics to the local economy.
- Conduct an "All Taxa Biodiversity Inventory" to analyze species distribution for the Discover Life in America Project.
- Use increasing complex levels of statistical methods for environmental modeling.
- Analyze census data for rural/urban planning and park and recreation planning.
- Analyze community health data and recommend areas for improvement.
- Partner with the Tennessee Department of Health in developing a "Healthy Living Index" that can be used across communities for comparative purposes. (http://www.mtsu.edu/exercisescience/NewsEvents_ExerciseSciences.html)

Why Should Place-Based Education Be Used as an Instructional Strategy?

Overall Benefits of Place-Based Education

1. Increased academic performance
2. Higher graduation rates
3. Greater rapport between students and teachers
4. More students motivated and prepared to enter STEM fields
5. Lower Absenteeism
6. Reduced behavioral problems which increases learning time and decreases

in- and out-of-school suspensions
7. Time outdoors and in the community Increases physical activity leading to improved health, e.g., lower obesity and diabetes, and addresses vitamin D deficiencies
8. Reduction in ADD and ADHD-related symptoms
9. Growth in Community Social Capital
   - Greater community involvement and community attachment
   - Greater investment of the community in the schools
   - More students coming back to live in the community
   - Increased civic pride and engagement

Benefits of Place-Based Outdoor Education

In Place-Based Outdoor Education experiences students will have:

1. Fun (the best kind of learning is fun)
2. An outdoor place that holds special meaning
3. Nurtured connections with friends, teachers and members of the community
4. Special memories of their experiences in the outdoors
5. Better social interaction skills
6. Greater independence and self-reliance
7. Improved physical health
8. Improved mental health
9. Developed a greater knowledge of nature
10. More understanding of their relationship to nature
11. Become good stewards of nature
12. Learned to communicate the importance of stewardship to others
13. Increased academic performance

Economic Benefits

With real-world activities at the core of Place-Based Education, students will be more prepared to move into the workforce with increased productivity and innovation, which directly addresses the goals of STEM. Business and industry can no longer afford not to become directly involved in our educational system because their future depends on it. Place-Based Education involving authentic experiences can also reduce the drop-out rate, which reduces the "double-whammy" drop-outs have on society. The first is a reduction in demands on social-welfare programs, such as health, prisons, and welfare assistance, and the second occurs when those students do not become productive members in the state's economy. And finally, the Service Learning component of Place-Based Education will contribute millions of dollars of in-kind resources (e.g. labor, data collection, research etc.) to Tennessee's economy.

An Interagency Commitment in Tennessee

The newly completed state plan, *Tennessee 2020, Vision for Parks, People, and Landscapes*, recently released by the Governor, commits Tennessee to an interagency collaboration process designed to establish a Place-Based education system which integrates local environmental topics into every subject at every grade level. Partners in this effort are the Departments of Education, Environment and Conservation, Agriculture, and the Tennessee Wildlife Resources Agency as well as State and local parks.

The Tennessee 2020 environmental education initiative takes the innovative step of focusing on the state's watersheds as learning environments. This emphasis is based on the fact that within walking distance of each school in the state is a creek or stream that can serve as an outdoor classroom. The watershed is an excellent unit of inquiry because it is an interrelated system where human and natural systems interact over a wide area. Thus, a student's investigations of a local stream do not stop there but lead on to questions about a broad range of influences and consequences distributed over a wide area. Environmental issues in a watershed relate to the area's history, social organization, and culture; the watershed system offers a rich variety of opportunities for addressing concepts in math, science, technology, engineering, social studies, English and communication.

Related Initiatives at the National and State Level

H.R. 2054, No Child Left Inside Act of 2009 would amend the Elementary and Secondary Act of 1965 regarding environmental education. This bill seeks to enhance the environmental literacy of American students, from kindergarten to 12th grade, to foster understanding, analysis, and solutions to the major environmental challenges facing the student's state and the nation as a whole. Appropriations would be provided to train teachers for such instruction, provide innovative technology, and to develop studies assessing the worth of these programs in elementary and secondary school curriculums. While mainly addressing environmental literacy, this legislation also seeks to touch on healthy living programs encouraging outdoor recreation and sound nutrition. (http://www.opencongress.org/bill/111-h2054/actions_votes).

Public Support

Table 1 summarizes the results of a random digit dial telephone survey in 2009 of over 500 Tennessee residents 18 years of age and older. The survey was conducted for the 2010 Tennessee state recreation plan, entitled "Tennessee 2020: Vision for Parks, People, and Landscapes" by the Human Dimensions Research Lab in the Department of Forestry, Wildlife, and Fisheries. These findings indicate strong public support for using nature and environmental education to teach across subjects. An excellent example of a school system partnering with the parks and recreation department is Paris Elementary School in Paris, Tennessee, which shares a gym, pool, and other facilities with the city's Parks and Recreation Department.

Table 1. Support for recreation programs involving school and park partnerships				
To what extent would you support/oppose a policy that requires:		**Oppose**	**Neither**	**Support**
	n	**%**	**%**	**%**
Tennessee's teaching standards include using outdoor nature and environmental education to learn math, science, reading and writing	562	6.2	7.7	86.1
Your local parks department to create areas in their parks with native plants and wildlife habitat for use as outdoor classrooms	560	6.5	12.3	81.3
Your community to have a school/park agreement that allows the two programs to use each other's existing facilities	551	10.3	9.7	80.0
New schools be built with windows that allow every child to see outdoors from their classroom	556	13.4	10.8	75.8
Schools to create areas on their school grounds with native plants and wildlife habitat for use as an outdoor classroom	559	13.0	13.1	73.9
New schools and school renovations be built with public park and recreation facilities so the schools and the public can use the facilities	556	18.7	14.9	66.5

Community Partners in Learning

- Industry
- Business
- Government (Local, State, Federal)
- Higher Education
- Religious Institutions
- Non-profit organizations

Implementation

While Place-Based Education can and should be implemented at all levels, it may be most important to start at the lower levels or even in kindergarten. Some university professors are finding college students have difficulty understanding and embracing inquiry as an instructional strategy, i.e., analyzing a topic or issue, formulating research questions, developing and implementing a methodological approach, analyzing and interpreting data and writing up conclusions. Surprisingly, some high school teachers who teach low, middle and higher level classes are finding students in the lower level classes embrace inquiry more readily than upper level students. One possible explanation is higher level students, who are also the ones admitted into college, are

adapt at and conditioned to memorization and related strategies needed to score high on tests. They have learned to exploit the industrial input-output education model very well, but are not well-prepared to be the scientists and creative thinkers of the future. Their critical thinking and problem-solving skills are not where they need to be for us to be as competitive in the global economy as we would like. Finding ways in the educational system to nurture and sustain the creative intellectual energies exhibited in early childhood, as seen by the ability to imagine and manipulate, would be a step in the right direction.

There are several ways Place-Based Education could be implemented. In each case, stipends and funding for training, equipment and transportation could be used as incentives. Funding and other resources could be made available through local communities. Some examples of implementation strategies are:

(1) Have a pilot project using 10 elementary, 10 middle and 10 high schools or more across the state, stratified by size, test scores, rural, urban, suburban, etc.

(2) Implement PBE gradually through professional development of teachers willing to incorporate PBE into their existing courses.

(3) Have teams of teachers across the curriculum at the same school and/or different schools submit proposals for team teaching using Place-Based Education. These teachers would be given a block of time during the school day to do PBE projects. Proposals could include commitments from community members willing to participate in the "Learning Projects."

Evaluation/Research

Standardized tests
Competency-Based student evaluations
Number of students interested in and choosing STEM fields as a career.
Level of community support for public schools
Compare PBE schools with controls or a PBE pod in a school with
non-PBE pods in that school.
Others?

Curriculum Materials or Learning Guides

A Place-Based Curriculum Committee or Task Force will be appointed with members from various disciplines joined with community partners as listed above. The committee will review existing materials that guide the process of learning through "inquiry" and facilitate the development of new materials for Tennessee as needed. This is a significant change from adopting "cookbook" curriculum materials from a textbook company to Tennesseans taking charge of developing learning materials and guides

specific to Tennessee. PBE materials will be as much about process as they will be about content, particularly given the richness of what is available through library resources, on the web, and partners in the community.

Budget

With Place-Based Education primarily using existing resources in the community, the cost of implementation will largely involve developing Tennessee-based curriculum materials and learning guides, professional development, equipment, and transportation. The budget depends on the level of implementation (examples of which are listed above under the Implementation section). Possible budget items are:

1. Development of learning guides specific to Tennessee
2. Staff with Expertise to Coordinate/Implement PBE
3. Professional Development ($50 per day stipend plus per diem.)
     1 or 2 week summer PBE Institutes
     2-3 day meetings during school year to share information and receive
          additional instruction
     Spring wrap-up meeting
4. Materials and Equipment
5. Consulting Services
6. Evaluation Services
7. Transportation

Funding Sources

1. Race to the Top funds
2. In-kind services from partners
3. Resources in the community (industry, business, etc.)
4. Stakeholders
5. Foundations

Current and Potential Partners in Tennessee (not inclusive)

Education
Tennessee Department of Education
STEM Centers
Oak Ridge Associated Universities
UT-Battelle/Oak Ridge National Lab
The University of Tennessee
          Institute of Agriculture
                    Extension
                    4-H

Academic/Research Departments
The Howard Baker Jr. Center for Public Policy
UT Teaching and Learning Center
College of Education, Health, and Human Sciences
K-12 Education
Service Learning Program
Collaborative Learning Program
Department of Psychology
Center for Information and Communication Studies (Data Network)
Middle Tennessee State University
Environmental Education
TMSTEC
Others?

Government
Tennessee Department of Environment and Conservation
Tennessee State Parks
Certification in Interpretation Training
Community Assistance
Natural Areas Program
Master Naturalist Program
Tennessee Wildlife Resources Agency
Tennessee Department of Agriculture
Division of Forestry
Tennessee Department of Public Health
National Park Service and the Fish and Wildlife Service (DOI)
(both have new education initiatives linked to "No Child Left Inside" (NCLI)
Others?

NGOs
Tennessee Environmental Education Association
Tennessee Wildlife Federation
The National Wildlife Federation
Tennessee's "Every Child Outdoors" Coalition
National "No Child Left Inside" (NCLI) Coalition
Others?

Industry
Automobile Industry
Others?

Business (Contacts with potential)
REI (Recreational Equipment Incorporated)
PlayCore Corporation

Research Centers
Human Dimensions Research Lab
Survey Research & Environmental Psychology
Department of Forestry, Wildlife, and Fisheries
The Howard Baker Jr. Center for Public Policy
Others?

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