

Brick Township Public Schools
Request for Board of Education Approval
Grant Application/Submission

Please complete this form and return it to James W. Edwards, Business Administrator/Board Secretary, prior to applying for or submitting a grant on behalf of any of the Brick Township Public Schools.

Date: 5/3/11

Name: John Richards / Mary Jane Garibay

School/Location: Veterans Memorial Middle School

Funding Institution:

Georgian Court University and EPA Environmental Education Grant

Address: 900 Lakewood Avenue

Lakewood, NJ 08701

Phone: 732-364-2200

Email (if available): wooltenh@georgian.edu

Anticipated Date of Grant Submission: _____

Purpose for which grant funds will be used (overview, please include the fiscal year: example: 2008-2009, purchase of 3 LCD Projectors):

2011-12 - VMMS will partner ~~with~~ with GCU in an EPA Environmental Education Grant - "Using project based learning to build environmental stewardship in New Jersey". The purpose of this grant is to create a series of materials designed to support teachers in creating project-based active learning experiences for Environmental Science Students.

Amount Requested: Participation - teachers who are willing to beta test materials that we provide / feedback.

NOTE: Upon completion, please submit a copy of the grant application to Mr. Edwards.

[Signature]
(Applicant's signature)

5/3/2011
(Date)

[Signature]
(BA/Board Sec. Initials)



GEORGIAN COURT UNIVERSITY

A tradition of excellence...a future of success

April 26, 2011

Dear Mr. Richards,

I am writing to invite you to be a partner in an EPA Environmental Education Grant that I'm currently working on with a colleague, Rich Mohr, entitled "Using project based learning to build environmental stewardship in New Jersey". The purpose of this grant is to create a series of materials designed to support teachers in creating project-based active learning experiences for their Environmental Science students.

The goal of this project is to impart the skills necessary for participants to make informed environmental decisions and to take responsible actions, with the ultimate goal of increasing environmental stewardship. What we propose to do is to roll out a series of projects that demonstrate sustainable landscaping practices and their impact on the environment. We plan to document everything we do using photography, video and blogs, and to measure the results. We will then provide all of these, along with suggested curricular activities, for use in environmental science classrooms. We will also support the teachers who choose to use these materials and their students through dynamic discussions via email and / or Facebook. Teachers can then either use the materials we provide and the data we collect as a basis of active learning assignments, or, if they'd rather, could use them as a model for projects implemented on their own campuses with our support.

What we are looking for is help from teachers who are willing to beta test the materials that we provide and curricular provide us with feedback on ways to make those materials better or to broaden their utility for classroom teachers such as yourself. If you'd be willing to help us in this, please could you provide us with a letter on school letterhead indicating such?

Very best wishes,

Louise Wootton, Ph.D.
Director of Sustainability and Professor of Biology

a. Project Summary

- i. **Organization and Partnerships:** Georgian Court University (GCU) is a private 4-year, Masters-1 University located in Ocean County, New Jersey. Georgian Court has an undergraduate Women's College with day courses, and a University College with co-educational evening and graduate programs. The proposed project will be managed by Louise Wootton, GCU's Director of Sustainability, and implemented by Rich Mohr, GCU's Sustainability Outreach Coordinator. Partners include local school teachers and community educators who have agreed to pilot the curricular materials developed and provide feedback and evaluations to help us in fine tuning the activities and materials provided to teachers through this project. Georgian Court has not previously and is not currently receiving funding from EPA for this project.
- ii. **Summary Statement:** The goal of this project is to impart the skills necessary for participants to make informed environmental decisions and to take responsible actions, with the ultimate goal of increasing environmental stewardship. Through hands-on experiences and image rich, multi-media supported, project-based learning opportunities, participants will develop the type of deep understanding of environmental issues that results in long term changes in behavior.

Educational Priority: This project will address both the **Community Projects** and **Teaching Skills** priorities by implementing a diverse group of environmental stewardship projects on GCU property, while developing the learning materials and support system needed to allow in-service educators to implement similar projects in local schools, home schools and community centers. We will also involve Georgian Court pre-service science-education students in designing and building the educational materials that will be one of the deliverables generated by this project.

Environmental Priority: This project will primarily address EPA's priorities for **Expanding the Conversation on Environmentalism and Working for Environmental Justice** by providing workshops and learning materials designed to be used in home schools, and by community educators, as well as in the traditional K-16 school system. It will also address the priority for **Protecting America's Waters** by teaching and promulgating strategies to improve soil health, which, in turn will help to improve water quality and reduce storm flows to local waterways.

Delivery Method: We plan to host a series of educator/practitioner workshops at GCU to directly engage and educate teachers, property managers and community leaders in hands-on projects to improve soil health and water quality by implementing sustainable landscaping practices. We will also share the learning materials generated via this project, including project instructions, video and photographic databases through GCU's website, and via a FaceBook page. We will also share materials from this project via workshops at the New Jersey Science Teacher's Convention, the Alliance for New Jersey Environmental Education (ANJEE) conference and other such venues.

- iii. **Audience:** We expect the hands on workshops to draw approximately 80 teachers, managers and community decision makers mostly from the counties within easy commuting range of our campus. The interactive learning materials developed through this project and delivered via our website will expand the reach of the project to thousands of homeschool families, K-16 teachers, community educators and other stakeholders throughout New Jersey and beyond.
- iv. **Costs:** The majority of the funds requested will be used to provide half of the salary and benefits of the outreach coordinator who will oversee and manage this project. Smaller amounts are requested to provide stipends for students who help develop the learning materials and the teachers who test them as well as to fund the workshops associated with this project. Funds are also requested for soil and water tests and associated sampling equipment needed to assess the environmental impacts of the sustainable landscaping practices implemented in this project on soil health and water quality.

b. Project Description

i. What : This project will address both the **Community Projects** and **Teaching Skills** priorities by implementing a diverse group of environmental stewardship projects on GCU property, while developing the learning materials and support system needed to allow in-service educators to implement similar projects in local schools, home schools and community centers. We will also involve Georgian Court pre-service science-education students in designing and building the educational materials that will be one of the deliverables generated by this project. Local scientists, legislative leaders, the Governor of New Jersey, and citizens throughout our community identify Barnegat Bay's top environmental issue as being the protection of our water quality and supply. There is also growing recognition of the critical role soil health plays in maintaining water quality and water supply within this and other watersheds.

The projects we propose to implement take strong action to promote an expansion of the **conversation on environmentalism** throughout the community by providing workshops, hands-on learning experiences and through provision of a dynamic series of web-based learning materials that teach, through demonstration and project based learning, the linkages between human and environmental health. The project will also address the priority for **Protecting America's Waters** by teaching and promulgating strategies to improve soil health and promoting sustainable landscaping practices, which, in turn, will help improve water quality and reduce storm flows to local waterways

The most productive action we can all take to protect our water quality and supply, as well as the health of our rivers, lakes and coastal water bodies such as the Barnegat Bay, is to adopt sustainable management practices on the lands where we live, work and play. The series of projects supported by this proposal will demonstrate such practices in action, and will provide students, property managers and other stakeholders with the opportunity for hands on participation. It will also extend the reach of the learning experience by developing numerous associated learning materials, including photo libraries and videos that can be used by all educators to enrich the learning experiences that they can provide their students.

All living things have physical needs which are both immediate and long term. In addition to these physical needs, humans have psychological needs for love and belonging, power, freedom and fun which play a critical role in the decision-making process of individuals and communities [1]. The short term outcomes of their decisions impact the formation and retention of beliefs, habits and cultural practices which may, or may not, be sustainable. By providing both hands-on experiences and image rich, multi-media supported learning opportunities for each project, we hope to help participants to translate their experiences with project activities into the deeper understanding that results in long-term changes in behavior. To facilitate this process, we will work to mentor team- and community-building skills among participants. We will also create opportunities for individuals to network with and continue to support each other following participating in our projects, training courses, and community events, as they apply environmentally friendly stewardship practices in their individual lives and begin to create and lead community projects of their own.

ii Why: In the United States, 50-70% of residential water consumption is used to irrigate the outside landscape [2]. Much of this is done to keep alive poorly chosen plants on badly degraded soils, with irrigation systems designed to sustain lawns cut far too low for their own health. This is done for the convenience of the property manager, with little regard for weather conditions, soil moisture, or volume of wasted water flowing into our storm drains rather than back into our

aquifers. In a region with abundant annual precipitation rates, due to its rapidly growing population and high per capita withdrawal rates, New Jersey is still vulnerable to water supply shortages, especially during periods of low rainfall [3]. When drought hits and water reserves limit sprinkler use, grasses mown too short and grown on compacted and damaged soil often die, rather than enter dormancy, as would be the case for healthy turf [4]. The resultant, severely damaged lawns are prone to erosion and increased nutrient leaching to the environment, and require substantial investment of time, money and resources including water and fertilizer for their re-establishment when conditions improve. New Jersey's water quality and water supply are now reduced to the point of threatening the capacity of our aquatic ecosystems to support bio-diverse, healthy wildlife populations, support local agriculture, and sustain an acceptable quality of human life [5]. In addition, compacted soils decrease infiltration, contributing to pulse flows during storm events, and decreasing access to the nutrient processing services provided by healthy soil. Compounding this, poor turf management practices result in both over-dependency on, and overuse of, fertilizers [6]. Nutrients from these fertilizers can then leach from managed areas into local waterways, where they contribute to the eutrophication, with all its many negative environmental consequences

Clearly, we not only need a better understanding of the relationship between plants, soils, water and humans; we also need greater experience in working together to face challenges that impact the diverse stakeholders in our rural, suburban and urban communities. Involving community leaders, educators and students in technically, behaviorally, and educationally sound landscape management projects has great potential to help us accomplish this task.

The proposed project will set up our campus as a demonstration site for a series of projects to improve storm water management and landscaping practices. We will then use both these projects as a foundation for a series of project-based learning activities. Project-based, experiential education strategies and units of study are valuable ways to support student learning in cognitive, affective, and behavioral domains related to environmental science and stewardship [7]. They have proven effective with students across the ability spectrum and are arguably the most effective educational methodology in helping youth at risk. Parents, teachers and community leaders are all key facilitators in teaching sustainable practices and providing short term benefits that reinforce responsible environmental decisions and actions by people of all ages. Training for New Jersey educators and community leaders in experiential education methods has been spearheaded by Project Urban Suburban Environments (USE) since 1970, with many great success stories [8]. However, despite their well documented success, experiential education methods are still largely implemented as isolated events in a largely traditional curriculum. Few schools or even grades implement more than a single or string of one-day on-site experiences, and even those experiences tend to address the foundational team- and community-skill building aspects of the curriculum, but stop short of supporting application of learned Cooperation, Trusting/Trust-building, Problem-Solving and Challenge Acceptance skill sets to the real world issues and problems for which they are intended to prepare students. School properties and the community of decision-makers involved in managing them provide a great opportunity for students to apply these skills, if their teachers are given the detailed knowledge, experience, and support needed to transform traditionally managed landscapes into sustainably managed ones. Once a school has adopted sustainable practices and is documenting the environmental and financial benefits, teachers and future students would be ready to accept the challenge of supporting change through projects beyond the school property in the local community.

(iii) How: The goal of this project is to demonstrate and engage learners in implementing environmentally sensitive landscape management practices that lead to improved soil health and water quality, and thus to improved health of local waterways and coastal waters such as the Barnegat Bay. We will then use those projects as a foundation to create dynamic, project-based active learning materials that can be used both in formal and informal education settings to engage learners in all ages in implementing these kinds of practices on their own properties and in their communities. We expect to realize this goal via the following steps:

1. Roll out a series of projects demonstrating sustainable landscape practices and document their impact on the environment. These projects and their results will underlie all of the education/outreach activities proposed here. Some of these are already underway, funded by other parties (e.g. rain garden created in partnership with Rutgers University, funded by the Barnegat Bay Advanced Rain Garden Education Initiative). In those cases, the projects proposed here for funding by EPA will add to their value by capitalizing upon the educational opportunities they represent. Another project, involving creation of a community garden mentoring environmentally friendly sustainable urban agricultural practices while producing food for local food banks, is being submitted parallel to this proposal to the Wal-Mart Foundation's Sustainability Funding Program. Again, we plan to use the learning experiences and opportunities that are provided by that project to interact with, enrich and enlarge upon those projects directly funded by EPA.

The projects that will be direct products of the funding requested from EPA include:

- Restoration of health of soil in a 150'x 50' area of lawn by relieving compaction, adding organic matter and adopting sustainable lawn management practices.
 - Implementation of low impact landscaping practices on university lawns, such as overseeding with low maintenance turf grasses, changes in timing and height of mowing and changes in irrigation, weeding and fertilization practices.
 - Design and construction of a wildlife conservation area as a component of a gravel wetland project designed to remove nutrients from storm water running off a large parking area into a storm water basin. Construction of this wetland represents another partnership between Georgian Court and Rutgers. We expect the initiative to be funded by NJDEP, and to take place in early summer of 2012.
 - Connection of a section of roof to a system of Rain Barrels for use in irrigating recently planted trees and other nearby ornamentals.
 - Restoration of native species meadows in several areas currently managed for turfgrass and shade trees by cessation of regular mowing.
2. Use these projects and associated activities to create environmental outreach opportunities and learning materials, making including educator/practitioner workshops, a website, and a FaceBook page. These activities will be designed to promote stewardship practices in all learners that will help build healthy soils and thus improve water quality of local waterways and coastal waters such as the Barnegat Bay. Educators can then either use the materials we provide and the data we collect as a basis of active learning assignments, or, if they'd rather,

can use them as a model for projects implemented on their own campuses with our support. Specifically we will take the following steps:

- The outreach coordinator, with seasonal help from paid student interns and volunteers, will record data and images from the creation and management of the above-listed implementation projects. Data collected will include cost of materials and hours of labor. Wherever possible, community involvement will be invited to create hands-on experiences. Digital video recordings of all major steps within the process will be made and edited to create electronic audio-visual instructional materials for appropriate target audiences.
- Four live, one-day workshops will be given on the application of sustainable horticultural practices to various landscape areas: natural woodlands, ornamental plantings, turfgrass, and vegetable gardening. Each will train participants to assess, plan and implement site management practices that work toward sustainability. Each will be recorded for electronic distribution to a wider audience.
- With the help of student interns, the outreach coordinator will create and maintain a FaceBook page, compiling, organizing and uploading the still images and data from each active project weekly.
- Units of study for each of the projects including suggestions for lesson plans and associated activities as well as learning materials such as the multimedia files described earlier will be created and delivered for classroom testing through the FaceBook page, an associated GCU website, and direct email to requesting classroom and homeschool educators. The related technical/horticultural questions of participating educators and professional site managers within the target area will be answered via email or directed to an appropriate, knowledgeable source.
- The partner curriculum panelists (listed in the appendix) will pioneer the use of these activities within their own classrooms and provide feedback for improvements that will be integrated into the learning materials, creating a living and responsive series of learning materials for as wide an audience as possible.
- The project manager and outreach coordinator will publicize availability of this curriculum unit to New Jersey teachers via websites such as that hosted by ANJEE, as well through venues such as the New Jersey Science Teachers' Convention.

iv. **Who: Target audience:** Hands-on training workshops on sustainable landscape practices will largely be targeted toward Property Managers, Urban Community Leaders, and Municipal Decision-Makers, since these are the people who will be likely to seeking the information we are offering to provide, as well as to implement those techniques within their communities after workshop completion. We expect 15 to 20 attendees at each of the four workshops. At least 6 GCU students will be engaged in ongoing maintenance and photo/video documentation of the various projects and their impacts, providing them with valuable learning opportunities as well as enriching the transferrable skills that they can bring to their careers and communities upon graduation. GCU students will also be engaged in developing curriculum materials based on the projects and multimedia resources collected during their progress. These curricular materials will be directed toward K-16 educators, and particularly to homeschool families and consortia/co-ops. Homeschooling is the fastest-growing form of education in the nation, provides another audience

well-suited for reaching through quality project-based environmental stewardship curriculum. Homeschool families are becoming better organized, better networked, and better supported with materials each year. There remains, however, a need for quality science curricula, especially at the upper grade levels. Homeschool families offer a great opportunity for educating the community, as parent/caregivers are directly involved in the teaching and learning. Many environmental education programs hope to reach the parents of publically schooled children. By writing curricula for homeschool families, we reach the parents directly, without using students as intermediaries to change parent perspectives or behavior. Incorporating hands-on landscaping projects into home school curricula means supporting and reinforcing behavior changes at home, where good ideas become good habits. Although it is hard to know how many people we will reach through the learning materials we produce as part of this project, the website from our previously funded EPA EE project received over 38,000 hits last year from 160 countries (over 25,800 of which were from the USA). We assume materials from the current project would have at least similar reach.

Recruitment plan: Both Dr. Wootton and Mr. Mohr have an extensive network of professional contacts that they will use to recruit Property Managers, Urban Community Leaders, and Municipal Decision-Makers to participate in the workshops and other learning experiences developed through this project. We will also send out flyers about the events through established networks, such as those associated with the Barnegat Bay Program, County Health Departments, Soil Conservation districts, local water authorities and others. Participants engaging in projects will receive follow up support, which is a key component of successful adoption of new practices [9]. Curriculum materials will include case-study examples of time and labor savings experienced by campus landscaping crews as sustainable practices are implemented on GCU. A site management practices self-assessment checklist will be made available to participating educators, students, families and property managers, and offered to local organizations for use by their staff or club members as well. The resources created through this project (teacher's materials, lesson plans, associated multi-media materials etc.) will be made available at no charge for teachers and other interested persons through Georgian Court's website. Dr. Wootton, Mr. Mohr and their students will travel to local and regional conferences attended by educators to present posters or papers about the activities and materials created through this project.

Using GCU's alumni network and both PI's extensive personal connections within the Environmental Education community, we have reached out to teachers in different learning environments including home school, magnet and traditional schools. Thus far, 5 teachers have provided us with signed partnership letters, but we have a number more who have expressed interest and will likely come on board as partners if this project is funded. These teachers will help test the materials we produce and will provide feedback on ways to improve their utility. These teachers will be donating a significant number of hours to this project. While in no way reimbursing them for this time, we plan to provide them with a small stipend upon receipt of their feedback in order to show our appreciation for their contribution to this project.

v. Project Uniqueness What sets this project apart is its emphasis on creating an active demonstration site for sustainable practice and then linking that with a unique set of learning activities, resources and active support for the project based learning we are working to mentor. What we are proposing to build here is not just a purely information-driven curriculum but, rather the opportunity to engage teachers and students in creating their own learning, by providing

materials that will allow them to create and learn from their own projects, while providing them with the support needed to make those projects happen in their own school/home/faith communities etc.

The Experiential Learning (EL) Model used in the proposed initiative uses all aspects of the Environmental Education Continuum [10]. It is often surprising to those unfamiliar with EL, that it *first* engages participants in doing rather than listening, by allowing them to engage in facilitated, physically, mentally and potentially even emotionally challenging *Experiences* (the Action-Stewardship end of the EE Continuum). Participants are then guided through *Reflection* (Awareness), *Generalizing* (Knowledge) and *Application* (Critical Thinking-Problem Solving-Decision Making) phases in preparation for future experiences in which they take greater responsibility and receive greater freedom and authority. Content learning, such as environmental science, math, communication skills, horticultural knowledge, marketing, then becomes critically relevant as important knowledge and skills which members of small teams contribute and receive the recognition and respect of their peers in which cooperation is learned, trust is built and problems are solved to the end of facing and overcoming challenges for accomplishment of common goals. Instructors become facilitators who support learners who now have very diverse, real, and immediate needs to acquire and retain skills and understanding. Thus, in this proposal we begin with involving students, teachers, and community leaders in implementation projects, finding roles for them to contribute successfully at the edge of their individual comfort zones. Then we process them through reflection and generalization of these experiences and equip them for the new experience of leading new learners through similar projects at home, school, or in the workplace.

c. Project Evaluation: We will endeavor to assess outcomes of these projects in terms of both their environmental and educational outcomes. Examples of environmental outcomes that we will assess include degree of soil compaction, amount of runoff and nutrient content in that run off in mitigated versus “control” regions of turf grass. We will also engage students in assessing changes in diversity and taxonomic composition of meso- and macrobiotic soil populations. For the wildlife conservation project we will observe and record increased use of area by wild species and assess (using surveys) passive recreational use and enjoyment by local residents, employees, and campus visitors. For the rain barrel and rain garden projects, we will record water flow into these systems throughout the year and will calculate the volume of water redirected from impervious surfaces and storm drains to pervious, vegetated soils. We will also work to assess the nutrient content of water entering and leaving the rain garden. We will use both photo-documentation and species surveys to document changes in the species composition of plants in the areas of turf grass that are restored to native meadows. In terms of the education component of the project, we will use surveys of participants to assess effectiveness of the workshops and will use feedback from each to improve the experiences of participants in subsequent workshops in the series. We will use the feedback provided to us by partner teachers to assess and improve learning materials produced in this project. We will monitor use of materials posted to the web using Google Analytics which allows one to track the numbers and origins of all web traffic to a given webpage or set of webpages. We will also use the volume of activity on the FaceBook page created in the course of this project as an indicator of our success in engaging learners in interacting with the various projects and activities that we develop.