

Report for 2003DC38B: Water Environment Studies in Schools Training Program

There are no reported publications resulting from this project.

Report Follows

**WATER ENVIRONMENT STUDIES IN SCHOOLS
TEACHER TRAINING INSTITUTE**

**WATER ENVIRONMENT STUDIES IN SCHOOLS PROGRAM
EFFECTIVENESS EVALUATION
Year - Three**

**Dr. Jo Anne Favors
UDC AGRICULTURAL EXPERIMENT STATION**

WATER ENVIRONMENT STUDIES IN SCHOOLS PROGRAM EFFECTIVENESS EVALUATION

WATER ENVIRONMENT STUDIES IN SCHOOLS TEACHER TRAINING INSTITUTE

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PROGRAM SUMMARY

INTRODUCTION

The University of the District of Columbia (“UDC”) Agricultural Experimental Station (“AES”) and Water Resource Research Center (WRRC), in collaboration with Kramer Middle, Browne Junior High, Terrell Jr High and Backus Jr. High Schools is proposing **Water Environment Studies In Schools (“WESS”)** to engage students in the exploration, analysis and restoration of selected areas of the Anacostia River Watershed. This **WESS Teacher Training Institute** is designed as a pilot project to 32 Junior High and Middle High School teachers in two Institutes - 16 teachers in each Institute - during the summer. These Institutes will engage teachers in ten-days of extensive training in water quality assessment and conservation, with a follow-up ten-day summer program practicum with students. Teachers will implement the program in school during the academic year.

Program Overview

The **WESS** program is designed to respond to the need for: 1. environmental education in the schools, 2. teachers proficient in the writing of curriculum around the newly designed performance standards, and, 3. innovative practices to improve math and science teaching and learning of teachers and students as expressed by DCPS administrators and teachers. The **WESS** program’s focus is the Anacostia River Watershed in which the students and teachers are residents. The goals of **WESS** provide for: 1. training for the schools' teachers in math, science, technology, art and humanities within water environmental studies; 2. involvement of students in the same discipline areas as required for the restoration and conservation of the Anacostia River and its flora and fauna; and 3. the development of a plan that engages the total community in the conservation of the Anacostia Watershed.

Program Goals

1. To establish a core group of teachers trained in the knowledge and technology to integrate environmental education into the total junior high school and middle school curriculum.
2. To provide teachers with the expertise to write curriculum that integrates the current performance standards and allows for their application and reinforcement in mathematics, science, arts and humanities through environmental education.
3. To provide teachers with the skills to help students to achieve and maintain the

academic standards necessary to bridge the transition from high school to college in science, mathematics and technology.

4. To increase the participation of minority youth in environmental issues and enhance their perspective of the effect they have on the environment through project focus on the Anacostia River.
5. To create a community movement to benefit the local environment issue which, in this case, is the Anacostia River.

Program Objectives

1. To engage teachers in the **WESS** Teacher Training Institute for a ten-day training session on the information and technology for implementing water environment studies programs with students.
2. To engage students in environmental studies that can reinforce skills and performance standards in math, science and computer technology, primarily; and arts and humanities in the process of learning the tasks necessary for the restoration and preservation of the Anacostia River Watershed.
3. To design a plan to improve the ecological integrity and aquatic diversity of the Anacostia River Watershed that includes strategies for reducing pollutant loads to improve water quality.
4. To establish collaborative and working partnerships with community residents and watershed restoration groups that can increase public awareness and participation in the clean up and restoration of the Anacostia River Watershed.
5. To familiarize youth and teachers with the unique careers in environmental and water quality management.

WESS Teacher Training Institute

The **WESS** Teacher Training Institute is designed to equip teachers with:

1. Knowledge and skills in the scientific testing, measurement and assessment and remote sensing of rivers, particularly the Anacostia River.
2. Curriculum development skills that integrate the Anacostia River scientific, social/political, and cultural aspects with the school's performance standards, career development and college preparation.

3. A critical overview of the need for a citizenry knowledgeable of their environment and the causes and effects of their own actions. Specifically using the Anacostia River as the model in this case.
4. Planning Methods and Strategies for implementing Water Studies program that:
 - Utilize the research of AES and WRRC, provides experiences in data gathering and increases academic achievement for students;
 - Provide resources and skills for independent searching for appropriate materials and equipment;
 - Use the metropolitan area as a bank of people, places and things that serve as viable elements of a hands-on curriculum.
5. The ability to lead students to design and implement a plan and process for restoring the River.

**WATER ENVIRONMENT STUDIES IN SCHOOLS PROGRAM
EFFECTIVENESS EVALUATION
Year – Three**

Introduction

This report reflects highlights and summarizations of the major findings of the Water Environment Studies in Schools (WESS) Program, Teacher Training Institute (TTI), for Year Three. These highlights and summarizations are based upon evaluation measures that document the effectiveness of the goals and objectives of the program. This report also addresses the program's strengths as well as areas for improvement.

Methodology

Pre-post program surveys and daily testimonial (evaluation/comment) forms for each workshop session during the institute were completed by the participants, and workshop observations and monitoring critiques were conducted by the evaluator. The process for collecting the data follows:

- Pre Program Surveys were conducted at the beginning of each (TTI).
- Program Testimonial Forms were completed by the participants on a daily basis and collected at the end of each session.
- Post Program Surveys were conducted at the end of the TTI.
- Evaluator's Observation and Monitoring Critiques were conducted during intermittent workshops for each TTI session.

Overview

The Anacostia Watershed is the focus of the **Water Environment Studies in Schools (WESS)** Program of the Agricultural Experiment Station ((AES) and Water Resources Research Center (WRRC) of the University of the District of Columbia (UDC). This project is designed to respond to the school's needs for: 1) environmental education, 2) curriculum developed around the performance standards, and 3) innovative practices to improve math and science teaching and learning of teacher and students as expressed by DCPS administrators and teachers.

The targeted area and participants for this project are schools and residents (including teachers and students) of the Anacostia River Watershed. This WESS TTI was designed as a pilot project to engage 32 Junior High and Middle School teachers in two Institutes – 16 teachers in each Institute during the summer. Kramer Middle, Backus Middle, Browne Junior High, and Terrell Junior High Schools were identified as the pilot schools. However, due to constraints within DCPS during the first year

of the project, the pilot schools were altered and a mixed cadre of schools and teachers participated in the WESS Program. Each year, since the pilot program, a variety of schools within the targeted area have participated in the project with emphasis being placed upon the participation of middle and junior high schools.

WESS Teacher Participants

This year, the project continued its expansion with a diverse population of teachers participating in the TTI. The thirty-two participants included teachers from elementary schools, education centers, middle, junior, and senior high schools as well as one college student. Some teachers were from schools of former participants and other teachers were from schools new to the program. The schools of former participants are: Backus MS, Kramer MS, Browne JHS, and P.R. Harris Education Center. The schools new to the program are: Birney ES, Wheatley ES, Garnet- Patterson MS, MacFarland MS, Jefferson JHS, Dunbar SHS, Mamie D. Lee School, and Clara Muhammad Charter School, as well as, Flowers SHS (PG County, Maryland) and UDC. The teacher from Flowers SHS (PG County, Maryland) and the student from UDC participated on a trial/pilot basis.

The pool of teachers consisted of two senior high, five junior high, eighteen middle level, five elementary, one special education, and one environmental education college student. This cadre included science, mathematics and technology teachers; reading, language arts, English, foreign language and social studies teachers; as well as a variety of specialists – media and special education.

The diverse composition of this group of teachers supported the purpose of this program by helping to ensure that the message of the project was carried to many venues through a variety of disciplines. Further the diversity of the group provided for reinforcement throughout the various disciplines, and carried a linked and unified message from level to level (elementary to middle to junior to secondary to college level).

WESS TTI Workshops

The WESS TTI provided teachers with an overview of the Anacostia River Watershed, focusing on the environmental impact of the community's actions and the need for citizenry knowledge of their environment. This focus was addressed through a series of workshops that not only provided a pathway to water environmental studies, but also provided a model to introduce and/or enhance environmental education in the schools. The model also provided strategies and tools for teachers to use as a support in the design of their school's standards-based (national and local, performance and content standards) water environmental studies curriculum.

Through the multifaceted workshops that included cross-curricular components, teachers were able to observe, demonstrate and apply innovative practices and skills that

are designed to improve mathematics and science teaching and learning of teachers and students. Through the use of technology and interpersonal connections, the teachers were able to form allies in soliciting and obtaining community support for the implementation of their school's environmental project.

A summary of each workshop follows:

Project WET – This workshop promoted awareness, appreciation, knowledge, and stewardship of water resources through the development and dissemination of classroom-ready teaching aids and through the establishment of state and internationally sponsored Project WET programs. Teachers received the Project WET Curriculum Guide and Rain Stick Book as well as learned modeling techniques to promote the enhancement of critical thinking skills in learners.

The Anacostia Watershed Society – Participants engaged in a discussion on the history and culture of the Anacostia River and experienced a canoe trip on the river. They also engaged in hands-on activities that can be used in the classroom.

USA TODAY Education – *Bringing Life into the Classroom with Real World Activities* is a workshop that demonstrated how cross-curricular topics can be taught utilizing relevant and timely articles found in the newspaper. Teachers engaged in hands-on exercises utilizing today's USA TODAY, examined environmental snapshots, explored *Before, During and After* learning strategies and surfed the net for additional online resources.

Wetland Nursery Pond – Participants worked with the staff from the National Aquarium of Baltimore to gain experience in constructing a Wetland Nursery Pond. The actual experience included preparing the area to hold water, separating and setting out plants, filling the pond with water and engaging in activities to support an understanding of the importance wetland areas.

Water Quality and Analysis – This workshop focused on the importance of water; properties of water; assessment, calculations and projections of water quality. Basic instruction was provided through lecture, discussion and hands on investigations; and then followed with internet explorations to acquire information for interpretation and application. As the study continued, teachers conducted water quality tests and analyzed the results of actual water samples from various points around the metro area including selected points along the Anacostia River.

Satellite Remote Sensing – The presenter of this workshop employed the use of U.S. Geological Maps and cartography to explain the science of remote sensing. Teachers explored “on-line” visuals and photographs of remote sensing graphics. Through the use of Excel software demonstrations and analyses were used to provide a more in depth understanding of this technology and it's application to the Anacostia Watershed.

The Value of Environmental Education – This workshop addressed local, national and international levels of environmental education. The teachers were able to make connections as to how local issues can impact national and international issues.

They explored the environmental monitoring activities of Green Peace, an international organization and engaged in activities relative to The Healthy and Safe Communities Campaign: “*Working to Protect Our Children, Families and Communities From Environmental Threats and Hazards!!!*” and related those activities to the Anacostia River Watershed.

The Value of Student Research on the Anacostia River –This workshop provided teachers with data from student research projects. The data was presented for observation, analysis, and interpretation. Teachers were provided instruction on the use of Excel and other software to construct charts and graphs that revealed the impact and value of environmental monitoring.

Art: The Design of Environmental Models and Variety of Materials Available – This workshop demonstrated how art could be used as an intricate part of environmental education studies. The workshop focused on “recycling” and “reusing” materials in order to “reduce” trash. Sample activities included making use of such materials in the construction of costumes, jewelry, and models. In addition, teachers wrote poetry and short stories about the environment and conservation.

Language Arts: The Inclusion of Literature, Writing and History into Environmental Studies – During this workshop, a variety of venues, such as music, art, poetry and literature were used to address the topic, *Water Matters*. Overall, the workshop provided a link to connect environmental studies with other disciplines. Effective communication skills (reading, writing, speaking and listening) were emphasized and numerous opportunities were provided for the participants to demonstrate the use of these skills. Activities such as writing poetry, short stories and letters, or conducting a mock forum to express views and concerns about water issues, the Anacostia River in particular, were examples that demonstrated a means for curriculum integration.

Applied Learning: Standards and Other Support - The teaching and learning standards were a key component of the WESS TTI. The national and local, performance and content standards for mathematics, science, art, and language arts/humanities were addressed throughout each workshop. Teachers were provided opportunities to review standards documents and to align appropriate standards in preparation for the development of their lesson plan. Throughout the course of the TTI, teachers were provided with model lesson and unit plans, and a template to use in the development of their own lesson plan. They were provided with instructional expertise via the master teacher and technology-based information via the internet. They were provided with classroom instructional materials (kits, books, videos, measurement apparatus, etc.) and hands-on/guided instructions to support the development of their lesson and ultimately support their classroom instruction. Additionally, teachers were able to collaborate with their colleagues and share information and ideas on an informal professional level, which in turn supported their growth in knowledge and their understanding of standards, water studies and instructional techniques and strategies.

SUMMARY OF EFFECTIVENESS EVALUATION

Pre-Program Survey Responses

The responses from the Pre-Program Survey represent the prior experiences of the teachers and their initial attitude regarding formal environmental education before their experience and participation in the Institute. Twenty-nine (29) participants responded to the survey. Each provided a response to all of the questions.

1. Do you have a formal environmental education program at your school?

Responses: Yes - 0% Maybe - 14% No – 86%

2. Have you led your students or co-workers in any environmental workshops or classes?

Responses: Yes – 14% Maybe – 0% No – 86%

3. Do you believe you have the expertise to conduct classes of youth in water environmental studies?

Responses: Yes – 28% Maybe – 14% No – 58%

4. Do you believe you have the competency to write a lesson plan on water environmental studies?

Responses: Yes – 52% Maybe – 17% No – 31%

5. Do you feel competent to match lesson activity to the school's performance standards?

Responses: Yes – 69% Maybe – 7% No – 24%

6. How do you expect to benefit from this Institute?

Written responses (all) were among or similar to the following comments :

- will gain information to improve writing skills and constructing lesson plans;
- will be able to integrate water studies and environmental activities into the curriculum;
- will use the information to make the students, teachers and staff aware of water pollution and conservation;
- will gain knowledge to engage students in hands-on water environmental studies;
- will grow professionally in the field of environmental studies.

7. How will your school benefit from this Institute?

Written responses (all) were among or similar to the following comments:

- will use ideas and strategies gained from TTI to form a school-wide interdisciplinary water environmental group to coordinate activities for our students;
- will share with students, teachers and staff the importance of having an environmental studies program and knowing about water pollution;
- will sensitize students to become wards of their environment;
- will be able to test water quality in streams near the local school; and
- will network and open avenues for our teachers to benefit through my professional development.

Summation of Pre-Program Survey Responses

The response data for question no. 1 indicates that the majority of the schools (86%) do not have a formal environmental education program, while a very low percentage of the schools (14%) may have a program.

The response data for question no. 2 indicates that the majority of the teachers (86%) have not led students or co-workers in environmental workshops or classes. Again, a very low percentage (14%) of the teachers have led either a workshop or a class for students and teachers.

The response data for question no. 3 indicates that a little more than half (58%) of the teachers do not believe they have the expertise to conduct classes of youth in water environmental studies, however they indicated they are willing to learn. 3% of the teachers believe they may be able to conduct classes of youth in water environmental studies with additional training and 37% believe they can conduct classes of youth in water environmental studies.

The response data for question no. 4 indicates that approximately two-thirds (73%) of the teachers believe that they have the competency to write a lesson plan on water environmental studies for youth. A few teachers (6%) indicate that they might be able to write the lesson plan with the support of the training staff. 31% of the teachers indicate that adequate training is needed in order to write the lesson plan.

The response data for question no. 5 indicates that the majority (75%) of the teachers feel competent to match lesson activity to school's performance standards. 6% indicate that they might be able to match the activity with the standards and the remaining 19% indicate that they are not ready.

The response data for question no. 6 indicates that the teachers in this Institute expect to gain knowledge about water pollution and conservation as well as strategies and activities that can be used to integrate the curriculum; and will gain information to increase environmental awareness for teachers, students and staff.

The response data for question no. 7 indicates that the schools will benefit from the teachers' experiences in the TTI in terms of their sharing their professional development; knowledge and understanding of water environmental studies; and through the formation of school-wide interdisciplinary water environmental groups to promote awareness, stewardship and hands-on learning.

There was no response data for the additional comments section.

Post-Program Survey Responses

The responses from the Post-program Survey represent the experiences of the teachers and their attitude regarding formal environmental education after their participation and closing experience in the Institute. Thirty (30) of the participants responded to the survey. Each provided a response to all of the questions.

Part I. Attitude Survey

1. Would you like to establish a formal environmental education program at your school?

Responses:

Definitely not	0%
Probably not	0%
Don't know	3%
Probably yes	40%
Definitely yes	57%

2. Has the Teacher Training Institute provided you with the tools to lead your students or co-workers in any environmental workshops or classes in the coming academic year?

Responses:

Definitely not	0%
Probably not	0%
Don't know	0%
Probably yes	30%
Definitely yes	70%

3. Do you believe you now have the expertise to conduct classes for youth in water environmental studies?

Responses:

Definitely not	0%
Probably not	7%
Don't know	3%
Probably yes	40%
Definitely yes	50%

4. Do you believe you have the competency to write a lesson plan on water environmental studies for youth?

Responses:

Definitely not	0%
Probably not	0%
Don't know	0%
Probably yes	33%
Definitely yes	67%

5. Do you feel competent to match lesson activity to your school's performance standards?

Responses:

Definitely not	0%
Probably not	0%
Don't know	0%
Probably yes	40%
Definitely yes	60%

Part II: Best Experiences and Challenges - Responses

The following questions invite you to discuss further your reactions to the Teacher Training Workshop. Please help AES by highlighting both the successes and areas where you would recommend change.

6. Please explain the following:

Responses:

A. What has been the best experience for you in this training workshop?

- all aspects of the program;
- varied exercises and experiences;
- the canoe trip and Anacostia Watershed Society;
- learning about Project WET;
- using hands-on activities;
- interacting with others in class;
- learning about wetland ponds;
- discussions on water environment.

B. What has been the greatest success for you personally?

- sharing in thought provoking experiences and discussions;
- gaining information about the impact of racism and government policies in regards to environmental factors;
- gaining hands-on experiences with developing a wetlands pond;
- receiving and using excellent materials;
- gaining information on how to integrate subject areas through water studies;
- learning about the Anacostia River and experiencing the canoe trip;
- gaining information that will be used to educate students on how to help clean up the environment.

C. Has the workshop met your expectations?

- 20% - yes, the workshop has met my expectations;

D. Exceeded you expectations?

- 80% - yes, the Institute far exceeded my expectations;

E. Fallen short of your expectations?

- 0% - The workshops did not meet my expectations. One participant stated "some days seemed too long for a presenter."

F. How will your school benefit from the experience that you have had?

- information will be used to help educate the students on how to help clean up our environment;
- workshops on environmental water studies will be conducted for teachers at school.

7. Please explain the following:

Responses:

A. What unmet needs remain for you?

- more information on subject areas;
- more trips to water sites;
- more support with incorporating knowledge gained into lesson plans;
- testing products and materials (system and/or standardized) in order to conduct classes with students.

B. What else needs to happen if you are to be able to offer water environmental studies for students in your school – as a lesson, a class or workshop, or a formal program?

- access to more materials and supplies such as water testing products;
- support of administration and teachers participating in the program;
- to have environmental science put back into the curriculum;
- to have city officials be concerned enough to provide financial resources to further support the project.

C. What challenges remain?

- determining how to help others understand the need to save our water;
- securing funds to support hands on activities and field lab experiences for students;
- organizing my thoughts, resources and materials in order to construct a meaningful curriculum.

D. What further help would you like from Agriculture Experiment Station?

- follow-up service to this institute by providing a one-day or half-day meeting, later in the year to discuss up-dates and classroom/student experiences;
- the provision of speakers for school programs;
- assist with a series of water studies workshops conducted at the school level.

E. What help would you like from school administrators?

- support from the administrators;
- assistance with funding materials and resources for the program.

F. From other teachers at your school?

- encourage fellow teachers in the local school's science department to use the resources of the program.
- encourage fellow teachers in the local schools to participate in the TTI.

G. From others in the workshop?

- teachers should work cooperatively to develop a more clear understanding of what to do back at school by producing a plan of action.

8. Please explain the following:

Responses:

A. What would you like to recommend to UDC Agricultural Experiment Station for future Teacher Training Workshops?

- the TTI workshops are excellent as presented;
- that every presenter use hands-on activities;
- train special group of students along with teachers to form an outreach group and promote stewardship;
- a follow-up component to see the progression of the wetlands pond;
- additional workshops during the school year;
- provide handouts on CD/disk to save paper;
- more trips to different waterways, Rock Creek;
- more outdoor activities;
- shorten the canoe trip, 5 miles is too long for new canoers;
- provide parking.

B. For other activities that could help launch formal environmental education programs in elementary, middle and secondary schools?

- continue this environmental program as a means to benefit our schools in their awareness of water studies;
- encourage the science department (DCPS) to include these tours and speakers as a support to the on-going curriculum;
- provide information regarding the TTI earlier in the spring to allow more teachers to participate;
- present the Institute more than once per year.

Part III. Plans for the coming year

9. Over the next academic year, are you now planning to do any of the following:

Responses:

- Use the Internet to collect further information on the environment

Yes – 97%

Maybe - 3%

No - 0%

- Acquire print resources from EPA, NASA or other sources on the environment

Yes – 77%

Maybe - 23%

No - 0%

- Take further classes on environmental studies

Yes – 50% Maybe - 50% No - 0%

- Offer a lesson or lessons in water environmental studies to students

Yes – 90% Maybe - 10% No - 0%

- Involve students in environmental research projects

Yes – 80% Maybe - 20% No - 0%

- Offer an environmental workshop to co-workers

Yes – 44% Maybe - 43% No - 13%

- Take students on field trips to study the environment

Yes – 84% Maybe - 13% No - 3%

- Launch an environmental research program in your school

Yes – 47% Maybe - 50% No - 3%

Summation of Post-Program Survey Responses

Part I: Attitude Survey

The response data for question no. 1 indicates that more than half of the participants (57%) would like to establish a formal environmental education program at their school. Slightly less than half of the responses indicate that 40% probably would establish a program. Only one person (5%) indicated that they are not sure whether or not they would establish a formal environmental education program.

The response data for question no. 2 indicates that the majority of the participants (70% definitely yes and 30% probably yes) consider that they have been provided with tools to lead students or co-workers in any environmental workshops or classes during the coming year.

The response data for question no. 3 indicates that the majority of participants (50% yes and 40% probably yes) believe that they have the expertise to conduct classes for youth in water environmental studies. One participant (3%) is not sure of their expertise and two participants (7%) believe that they probably lack the expertise to conduct the class.

The response data for question no.4 indicates that the majority (67% yes and 33% probably yes) believes that they have the competency to write a lesson plan on water environmental studies for youth.

The response data for question no. 5 indicates that the majority (60% yes and 40% probably yes) feels competent to match lesson activity to the school's performance standards.

Part II: Best Experiences and Challenges

These questions invited the participants to discuss their reactions to the Teacher Training Workshop. They included both successes and areas of recommendation for change.

The response data to question no. 6 resulted in a variety of answers in terms of the best experiences, greatest personal successes, workshop expectations and benefits to schools.

Many participants indicated all aspects of the program were the best, while others cited specific components of the program such as, but not limited to Project WET, the canoe trip, hands-on experiences, and sharing interactive information with and among classmates. Though this compilation of responses each segment was cited as a best experience.

Responses to the greatest personal success focused on three categories: interacting through thought provoking discussions and gaining new ideas; coming to the realization of the impact of racism and government policies on environmental issues; and hands-on experiences (involving the Anacostia River and AWS as a whole) that will be incorporated into instructional practices to educate the students.

The responses to workshop expectations indicated that the workshops either met expectations (20%) or exceeded expectations (80%). There were no responses indicating that the workshop did not meet their expectations, however, one participant stated "some days seemed too long for a presenter."

Responses defining school benefits from teacher experiences indicate that information on environmental studies and the Anacostia River Watershed will be shared through classes for students and teacher workshops.

The response data to question no. 7 represents needs and recommendations for the program.

The majority of the responses indicated that there were no unmet needs. However the remaining responses indicated the following recommendations: 1) a need for prepared testing products and materials to use with students in order to support further alignment of this program with school standards and curriculum;

2) a need for additional support with developing lesson plans; and 3) a need for environmental science to be put back into the schools' curriculum.

Responses to challenges indicated a personal need for time to conduct research work in order to collect data on resources and work on plans to support the implementation of the program; and a need for promotional strategies to support the development of the program in the community with students and citizens.

Responses to further the assistance from AES indicate a need for follow-up service to the workshop by promoting a one-day or half day meeting later during the school year to provide updates and classroom/student experiences.

Responses regarding the help participants would like from school administrators indicate a need for administrative and financial support to ensure the implementation of the program.

The responses regarding help the participant would like from other teachers indicate that fellow teachers within the school should be encouraged to use the resources of the program and should be encouraged to participate in the training.

The response regarding help the participant would like from others in the workshop indicate that all teachers should work cooperatively to develop a clear, detailed school action plan for implementing and sharing the program.

The response data to question no. 8 represents recommendations to AES for the future Teacher Training Workshops.

Responses indicate that UDC AES consider the following recommendations for future Teacher Training Workshops: ensure that every instructor present hands-on activities; include a special group of students in the summer training component; provide handouts on CDs to conserve paper; provide a follow-up component including revisiting field trips (i.e., wetlands pond) and up dating experiences with fellow Summer Institute classmates.

Responses regarding activities that could be used to launch formal environmental education programs in other schools indicate that the WESS program should visit schools to help tie program into the existing curriculum and present the TTI more than once per year.

Responses to no. 9 indicate that the participants are considering the following plans for the coming year. The majority (97% yes and 3% maybe) will further their use of the Internet to collect information on the environment. The majority (90% yes and 10% maybe) will teach water environmental studies lessons to students. The majority of participants (84% yes and 13% maybe) will take field trips and involve their students in environmental research projects, while one

participant (college student) responded no. The majority (77% yes and 23% maybe) will acquire print resources from environmental organizations. 50% yes and 50% maybe indicate they will take further environmental education classes. Less than one-half (44%) will offer workshops to their co-workers, 43% indicated maybe and 13% indicated no. Slightly less than one-half (47%) responded yes to - launch an environmental research program in your school, while 50% responded maybe and one participant (college student) responded no.

WESS TTI Monitor's Critique for Sessions I and II - Sampling

During each of the sessions various workshops were monitored and critiqued. The observations assessed the presenter's strategies, the engagement and participation of the teachers, and the relevancy of the activities as they pertain to the WESS program. The following review will provide an overview of the session and will include the strengths, areas of improvement needed, and recommendations as they apply to the session.

- **Project WET:** The presenter engaged teachers in numerous hands-on experiences and modeled for them a variety of ways to teach water studies through an integrated curriculum. The strategies included such examples as conducting investigations to determine water quality; solving number-based problems; reading for understanding and interpretation; and identifying water-forms and habitats. This workshop also modeled the use of making various cultural connections in an effort to personalize the activities as well as bring in historical facts for students. This workshop was rated highly among the participants and often listed as a favorite in their daily testimonials.
- **Wetlands Pond:** This workshop was facilitated by a team of instructors who helped the participants form cooperative learning groups in an effort to prepare for the setting up process of the pond. An overview along with modeling instructions for each activity associated with the set up process for the pond was provided for the class. Each team was given an opportunity to engage in the various segments of the pond set up process which included: preparing the area and constructing the pond; identifying, sorting and separating the grasses; planting the grasses; and filling the pond with water. Following these activities the participants then proceeded to engage in activities that would simulate a study of the wetlands. All participants were given materials to design a model of a wetland area and resource materials to help support their understanding of the concept. It was further noted that these materials could serve as a tool for the participants to use with their students in teaching "the need to care for the survival of wetlands." The presentation and the involvement of participants with the activities were in direct alignment with the goals of the WESS Program. There was high enthusiasm for this workshop and it was also reflected in the participants' daily testimonials.

To support the effectiveness of this workshop the recommendation would be to plan a follow-up visit for the teachers and more importantly to provide an opportunity for the students from the schools to visit the site and conduct investigations.

WESS TTI Testimonial Responses for Sessions I and II - Sampling

The following data represents a sampling of the participants' responses to the testimonials that were collected each day. The sampling shows the correlation of the workshops presented throughout the Institute and represents on-site instructional lab activities and off-site first hand field lab experiences. This sampling includes responses from both TTI sessions for the Water Quality and Analysis workshop and the Anacostia Watershed workshop. The testimonials are in response to the following statement:

The overall objectives of the Water Environment Studies In Schools program is to empower teachers to engage their students in: water quality assessment, wetlands studies, environmental monitoring, the application of computer technology in program development and problem solving activity, and the formation of community support for environmental conservation.

Workshop: Water Quality and Analysis

What do you believe you learned today?

- *Water Quality Assessment, Wetlands*
 - how important water and the quality of water is to the environment;
 - basic facts about water (physical and chemical qualities of water);
 - how to test water with chemicals and various instruments;
 - how pollution affects the Anacostia River; and
 - how DC water compares to bottled water.

- *Technology Application*
 - how to conduct a computer search, analysis, charting and graphing;
 - learned good websites; and
 - how to prepare a presentation on water using power point.

- *Environmental Monitoring Plan*
 - learned planning methods and strategies for implementing a water studies program;
 - learned history of the Anacostia River; and
 - learned to organize information to support the design of the curriculum.

- *Community Support*

- how to apply the WESS program to a school/community project through classroom instruction, technology and field trips; and
- think clearly about activities and resources for the enhancement of community support.

2. What helped you reach your goal?

- using the computer to compute, analyze and chart graphics;
- using the computer to problem solve and to access information;
- environmental conservation and environmental monitoring; and
- collaboration among team colleagues.

3. Favorite part of the program so far?

- testing water for impurities;
- hands-on activities;
- discussions - environmental factors that are affected by water;
- using computers to make charts; and
- discovering new experiences.

Workshop: Anacostia Watershed Society

1. What do you believe you learned today?

- *Water Quality Assessment, Wetlands*

- how pollutants affect the Anacostia River;
- how the pollution in the Anacostia River and other water forms affects all living creatures; and
- observed and learned basic facts about wetland revitalization of marshland.

- *Technology Application*

- how to use various instruments to conduct water quality test.

- *Environmental Monitoring Plan*

- learned more about the history of the Anacostia River; and
- learned to canoe a boat along the river in order to collect samples to make first hand observations.

- *Community Support*

- how to apply the WESS program to a school/community project through classroom instruction, technology and field trips; and
- think clearly about activities and resources for the enhancement of community support; and
- the importance of sharing the message to keep the rivers clean.

What helped you reach your goal?

- canoeing along the river;
- using instruments to collect actual data along the river;
- environmental conservation and environmental monitoring; and
- collaboration among team colleagues.

Favorite part of the program so far?

- the canoe trip;
- hands-on experiences;
- real-life learning, learning by doing;
- exploring materials shared by the instructors and interacting with colleagues.

Summation of Testimonials

Each day, participants completed a form, addressing the above questions. The responses for question no. 1 indicate what the participants have learned for the day in regards to water quality assessment, wetlands studies, environmental monitoring, the application of computer technology in program development and problem solving activity, and the formation of community support for environmental conservation. These items address the goals and objectives of the program. Favorable responses to these questions indicates that the participant is on target and is meeting the goals and objectives for the program.

Questions no. 2 and no. 3 serve as reinforcement to question no. 1. These testimonials indicate that the participants are learning how to operate and/or become more proficient with the use of a computer, as well as use other technical support to study the overall facts about water and how pollution affects the river. The complete set of testimonials may be found in the appendix.

The two sets of data show the correlation between the sessions and how the participants are able to build upon the acquired knowledge in each of the workshops.

Summary Of Survey Results

This information documents the analysis of the results of participant responses to Pre-Program and Post-Program Surveys. This information is reflective of 29 pre-program responses and 30 post-program responses of the 32 participants who represent 14 schools.

The Pre-Program Survey responses indicated that of the 14 schools participating, four may have formal environmental programs. The responses indicated that 4 of the 29 teachers have previously led student or coworker environmental workshops. The responses indicated 8 of the 29 participants believe they have the expertise to conduct classes in environmental studies for youth. Fifteen of the 29 teachers believe they have competency to write a plan on water environmental studies and 20 of 29 feel competent to match lesson activity to performance standards.

The Testimonial responses provided indications of self-growth, confidence, and personal accomplishments as a result of their participation in the WESS Teacher Training Institute.

Post-Program Survey responses indicated that all schools to a degree (yes/probably yes) with the exception one would like to establish a formal environmental program. The one exception being the college student, with a response of “don’t know.”

All participants, to a degree (yes/probably yes), indicated that the TTI provided them with tools to lead students or co-workers in any environmental workshop course.

The majority of the participants, to a degree (yes/probably yes), indicated that they have the expertise to conduct classes for youth on water studies. One response indicated “don’t know” and two responses indicated “probably not.”

All participants, to a degree (yes/probably yes), indicated that they have competency to write a lesson plan on water environmental studies.

All participants, to a degree (yes/probably yes), indicated that they feel competent to match lesson activity to their school’s performance standards.

Indication of Goals and Objectives Met:

In general, the responses indicate that the WESS Teacher Training Institute participants have gained an awareness of water environmental education, in particular, the Anacostia Watershed. The responses indicate that the workshops were facilitated and guided by knowledgeable, expert presenters, whose instructional skills enhanced the participants' use of technology and their use of the Internet to access information and apply it to the development of personalized standards-based curricular for their schools. This curricular includes a match of national and district, content and performance standards.

Further, the responses indicate that during the workshop sessions, participants have engaged in activities that provided knowledge and skills to support student improvement in mathematics, science and technology. They also gained instructional strategies that support the integration of scientific, social and cultural aspects of teaching and learning. They have designed a plan that engages the community in the conservation of the Anacostia Watershed. The responses also indicate that the participants will promote citizenry knowledge of the Anacostia River Watershed through classroom instruction, workshops and community forums with the support of environmental speakers and environmental projects.

Additionally, the daily testimonials and the monitors critique support the responses to the post survey summary.

Strengths of the WESS TTI

Based upon the evaluation of the program the following strengths are documented:

- **Range of Schools:** The broad range of schools from elementary to middle level to junior high to senior high provides a continuum of the program and prepares building blocks for each level of awareness of environmental studies. The inclusion of the college student and teacher from Prince George County Public Schools, Maryland furthered the broadening concept of the program.
- **Diversity of Subject Area Teachers:** The inclusion of teachers in all subject areas helps to strengthen the program by broadening the instructional base for broadcasting the importance of water studies and water conservation.
- **Use of Standards:** The inclusion of standards (national and local, performance and content) makes for a complete curriculum for lessons and units in relation to the school's required standards.

- **Integration of Discipline:** The integration of the disciplines (science, mathematics, art, language arts/literature) again helps to ensure that the environmental message is being delivered to the students as well as the community through a variety of venues.
- **Variety of Environmental Workshop Sessions:** The variety of environmental education sessions associated with the importance of water and water quality helps enlighten the participants as far as their responsibility in communicating the message “to help conserve the environment and keep water safe.” The variety of sessions also models different means for broadcasting the message and levels of involvement.
- **Field Trips:** The inclusion of the field trips provides a concrete hands-on experience that vividly identifies for the participants the need to help protect “our” water sources.
- **Use of Resources in the Program:** The use of the computer and Internet accessibility, the newspaper connection and supplemental resources, and integrated water programs (Project Wet) enhance the participants ability to gather information and supports the structural development and design of lesson plans.
- **Expertise of Instructors:** The knowledgeable and expert instructors provide a wealth of information in terms of content, instructional skills, innovative practices, and resources.

Need for Improvement:

Based upon the evaluation of the program the following areas of improvement are needed:

- Providing a variety of teaching/learning strategies to ensure that each participant is understanding (connecting) with the material being presented.
- Explaining how the goals of the project relate to each workshop in an effort to ensure each participants understanding and connection.

Recommendations for WESS TTI:

Based upon the evaluation of the program the following recommendations are made:

- Establish a forum whereby participants can meet to collaborate, reflect and share ideas and strategies to support the program.

- Plan a follow-up for teachers to visit the Wetlands Nursery Pond and (if possible, avail this opportunity for the students from the participating schools so that they can conduct on-site investigations).
- Re-institute student involvement through the summer program.
- Continue to share environmental education grant opportunities with participants in an effort to support their acquisition of additional funding sometimes needed to assist the development environmental programs.
- Invite school administrators to participate in the program on a part-time or full time basis to help ensure their support of the program.

The overall study of the WESS Program indicates that there is continued growth among the participating teachers and that they have gained an awareness of the importance of water environmental studies. Further, they recognize the importance of continuing this program.