Second Year Report
for

Exploring Our World

A Summer Mathematics, Science, and Technology Program at Prince George’s Community College

In Support of the Equity 2000 Project of the Prince George’s County Public School System and the College Board

Funded by the Department of Energy Pre-Freshman Enrichment Program for 1995 and 1996

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Overview
Prince George's Community College (PGCC), in collaboration with the Prince George's County Public School System (PGCPS) modified the Exploring Our World\(^1\) program during the spring of 1996. The second year of that program was delivered to twenty-six rising seventh and eighth grade students, and one rising ninth grader during the period July 9, 1996 to August 2, 1996. As in 1995, Dr. Baldwin coordinated and supervised the program; Charles Hoffman was the teacher; Patricia Crosson was the counselor; Kishma Brown was the paid college mentor; and Dante Brown was a volunteer high school mentor.

Exploring Our World met six hours per day, four days each week, for four weeks. One day each week was devoted to a field trip, while the other three days were spent on-campus in a variety of classroom, library, computer laboratory, and science laboratory activities. Each student was randomly assigned to one of six groups. Each group conducted a research project and presented project results to parents, staff, and other participants on the night before the last day of the program.

Recruitment and Attendance
The second Exploring Our World program was presented to the parents of Saturday Academy students during the first session of the spring 1996 academy program, and applications were accepted during the first five academy sessions. Twenty-eight applications were received. Selection criteria included number of Saturday Academy sessions attended by student and parent and written recommendations of the Saturday Academy staff. All applicants were ultimately invited to attend, but two families were unable to participate. The participants included seven students entering ninth grade (high school) and nineteen students entering eighth grade (middle school). A total of eight female and eighteen male students enrolled. The large majority of the students were African American; there was only one Caucasian student. Most students were new to Exploring Our World; one student was admitted for a second summer, based upon the request of his parents, because his brother was also participating.

Family Orientation
They held Family Orientation for the 1995 program on the night before the program began. Several parents suggested that family orientation be sooner so that they would have the necessary information for making summer plans. For the second year of the program, they scheduled Family Orientation on May 23. Although this program was helpful for those who attended, only fourteen families were present at the May session. They held a second orientation program on July 8 for the other twelve families. During both orientation programs the staff presented an overview of the program, answered questions, and assisted families in arranging car pools.

\(^1\)The original program proposal to the Department of Energy was entitled Expanding Our World, but the name was instead changed during the spring of 1995 to Exploring Our World.
Career Interest Inventory
Ms. Crosson led the students through and exploration of career interests and options. During the program the students completed and scored a career interest inventory using the Discover computer program, and explored different types of occupations were associated with their respective interests. Each group also used Discover to learn about occupations related to their group research projects.

Mathematics Skill Diagnosis and Development
They employed the Plato interactive computer learning system to diagnose student entry level mathematics skills, to provide individualized instructional materials to develop those skills further, and to track individual progress in that development. Although all students were rising seventh and eighth graders, the initial grade level placements varied from second to seventh grade in basic mathematics literacy. One-half of the students placed at or above the fifth grade level. Plato uses a computer adaptive placement technique. All students started with assessment questions at the sixth grade level. Plato then adjusted the grade level up or down, based on the ongoing performance of the individual student. As in 1995, some students did not try to do their best work when they first started using Plato, and hence were placed at grade levels below their real knowledge and skill levels. Several students had difficulty with long division, and were initially placed at low grade levels due to those problems. Once these students mastered long division at the placement level they were able to move quickly to the next grade level.

Once the initial assessment was complete, students worked through the modules from which they had not been exempted at the initial grade level. Whenever a student mastered one grade level, they would immediately progress to the next grade level. During the first three weeks of Exploring Our World, the students worked with Plato at least three times each week. At the end of three weeks, Plato progress reports were given to all parents at the end of the program. The table below shows the initial and final mathematics grade level for each student. The last column shows the Plato time on task, measured in hours, for each student. Although all students were scheduled to spend the same amount of time in the Plato lab, the variation among time on task measurements primarily reflects differences in student motivation. Some students spent extra time before and after the program each day, while other students procrastinated during much of the time they spent in the lab. One student’s data was omitted from the table, because he would not participate in the Plato activities. The last three rows of the table show the minimum, maximum, and average values for these data.
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Minimum: 2.0 3.0 0.4 2.6  
Maximum: 7.2 7.8 4.2 12.3  
Average: 4.1 6.0 1.9 6.3  

Prince George's Community College  4
Group Projects
During the first week of Exploring Our World, each group selected a topic that they wanted to study and about which they would report at the end of the program. There were six groups with four or five students in each group. Planning staff had identified a list of potential research topics, each of which was related to the learning activities they had designed for the program. The six topics selected by the groups were: “Forces of Flight,” “Acid Rain,” “Energy Absorption,” “Ozone Depletion,” “Turbidity and Erosion,” and “Convection and Weather.”

During the 1995 program, the last week was devoted to group preparation of reports. The staff found, however, that middle school students needed much more preparation time than this. During the first week of the 1996, the students were taught to use library resources so that they could begin researching their reports. Students used the CD-ROM periodical indexes, the computerized card catalog, and the Internet. Throughout the program the staff helped individual groups conduct their library research, analyze their data, use spreadsheet software to prepare tables and graphs, and use word processing software to write their reports. Then, during the last week, Ms. Marlene Cohen, a full-time member of the PGCC Speech and Theater department, helped each group organize and rehearse their oral presentations.

The original plan was to teach the students to create their own group world wide web pages, in which they could publish their reports. This turned out to be too ambitious an activity in the time available. Dr. Baldwin did use the web, however, to post the following instructions and criteria for the reports. Although the students did not create web pages, each group prepared their final oral reports according to these instructions. A sample of these instructions is provided below.
EOW Project Report Organization

Each group will present its project report in a series of web pages. These pages will be organized in the following manner:

Project Title Page: The first page for each project report will present the title of the project, and introduce the reader to both the project topic and the group which is preparing the project report. Explain what the project is about and why the group is interested in this topic. It is important to make this page both interesting and attractive so that your readers will want to explore your other pages. The title page will also provide links to at least three additional pages which are described below, in addition to links back to the EOW Group Project Page and the EOW Home Page. Every other project page will provide a links back to the Project Title Page, the EOW Group Project Page, and the EOW Home Page.

1. Project Description Pages: Each report will include one or more pages which describe the project topic in more detail. This description will be based upon a survey of available literature, and will include bibliographic references to books, periodicals, and electronic information found on the World Wide Web. Links to related web sites will also be provided here.

2. Project Experiment Pages: Each report will also present an experiment conducted by the group. This presentation will present and describe:
   1. The purpose of the experiment.
   2. The materials used.
   3. How it was conducted.
   4. Data collected and analyzed.
   5. One or more graphs which present that data visually.
   6. Findings and conclusions.

3. Related Career Information Pages: Each report will identify one or more career fields which are related to the project topic. Career information will be collected using Discover software, Career Library materials, and the World Wide Web. For each career field, the report will present and describe the:
   1. Types of work performed and typical work environments.
   2. High school and/or college education and training required.
   3. Job availability and salary range.
Weekly Themes and Field Trips
To provide first hand experiences related to the group report topics, each week of Exploring Our World had a theme and included a field trip. The theme for the first week was "Getting Started." Besides group formation and project selection, students completed their Plato mathematics skill’s assessment and Discover career interest inventory, and then started their work with these computer programs described in more detail later. The students were also introduced to exploring the world wide web using Netscape, and to methods of library research. In the laboratory and the classroom, student groups also began to conduct experiments, and to collect and analyze data. At the end of the first week, the class traveled to the Smithsonian Institution in Washington, D.C. In addition to a special demonstration entitled “Forces of Flight” and an IMAX film entitled “Blue Planet,” student groups explored different exhibits in the Air and Space and Natural History museums.

The theme for the second week was “The Environment.” Besides continuing individual work with Plato and group work on projects and Discover, the students also learned to use Pine for sending and receiving Email on the Internet. The class began its study of the environment of the Chesapeake Bay in both classroom and laboratory activities to help prepare for a field trip down the Patuxent River to Solomon’s Island on the Chesapeake Bay. Each group collected water quality data and water samples at several locations during this day long trip. They learned about the bay as an estuary environment at the Calvert Marine Museum, and they explored a coastal marsh at Flag Ponds park. Unfortunately, a visit to the beach at Flag Ponds had to be canceled because of a summer afternoon thunderstorm. In the laboratory during the following week, the students examined water samples they collected during the trip under microscopes, learning to locate and identify various organisms.

The third week focused on “Air, Space, and Computers.” In addition to continuing individual and group activities, the students also learned about how computers work. Each group disassembled and reassembled their own computer. In the computer lab, students also began learning to use Excel to construct spreadsheets and graphs to aid in numerical analysis of data related to their group projects. On their field trip, the students visited the Andrews Air Force Base FAA tower, Weather Squadron, and 1st Helicopter Squadron. Then, during the afternoon, the class traveled to the Naval Research Laboratory, where they learned about various NRL activities and toured a satellite testing laboratory.

The final week was devoted to “Wrap Up” as the students worked on finishing their group projects. This included some additional experimentation, further work with Excel, and individual writing of various sections of the group reports using Word. Besides finishing their work with Plato, Discover, and Netscape, the students also prepared and rehearsed their oral reports. The students invited their families to attend the closing night ceremony when each group gave its report. They used a computer and projector to illustrate their reports with data tables and computer graphics. The week ended with a picnic and fun day at a local park.
Continued Funding for 1997
The Prince George’s County Public Schools (PGCPS) are continuing to fund Saturday Academy, now in its fifth year, and during the spring they also agreed to take over responsibility for funding Exploring Our World. Recruitment for the summer 1997 program was conducted during the spring Saturday Academy program, following much of the successful 1996 recruitment and enrollment model. The Exploring Our World staff is presently engaged in planning the summer 1997 program, which will begin on July 15.

Summary Evaluation and Lessons Learned
The second year of Exploring Our World provided many valuable experiences for both the student participants and for the staff. Daily attendance was excellent, and through Saturday Academy we have continued to maintain contact with many of the students. Both students and teachers continue to provide anecdotal reports of increased interest and improved performance in school during this academic year. All of the participants from both the 1995 and 1996 Exploring Our World programs have graduated from Saturday Academy, and some have returned to work with the program as volunteer high school mentors.

As can be expected with any new year program, however, not every activity went as planned. As the primary Exploring Our World instructional staff continues to discuss the program and plan for summer 1997, several changes have been planned:

In both 1995 and 1996 we have found that we need allocate more time to information research before field trips and to the process of conducting research projects. Although the process of preparing and delivering group project reports improved greatly between 1995 and 1996, still more progress is needed. Based upon our experiences and lessons learned in the first two programs, we are making several adaptations to the 1997 program:

1. Although we will continue with weekly themes, we are also organizing the entire four week program around a single central theme. The 1997 theme will be “The Chesapeake Blue Crab.” The staff is in the process of refining six specific project topics, all of which deal with crabs, and developing structured and detailed strategies for introducing and guiding each group through the research for their respective projects.
   a. In addition to contributing to the overall theme, the preselection of topics will better enable the staff to prepare specific activities and sources of information to help each of the six groups during the research process.
   b. Classroom and laboratory activities, along with weekly field trips are being designed which will all tie into the theme of crabs and will relate to the project topics.
During both the 1995 and 1996 programs we learned that middle school age students found it difficult to focus on oral instructions during hands-on activities. One part of the problem stems from the students' natural curiosity and excitement when working with equipment in science and computer labs. Another part of the problem associated with oral instruction is the noise level that results when all twenty-five students start talking to their neighbors about what they are doing with their hands.

In 1996 we organized the class into two teams with three student groups on each team. We then scheduled many activities on a team basis rather than a class basis, so that fewer students would be working in the same space simultaneously. While one team was working with *Plato*, for instance, the other team would be working with *Discover* or *Netscape* in a different computer lab.

The team strategy was successful and will be repeated whenever possible during the 1997 program. In addition, more emphasis will be placed in 1997 on preparing written activity instructions to replace oral instructions. Then the staff can spend their time helping individuals and groups interpret and follow those directions rather than needing repeatedly to get everyone's attention to give further oral instructions.

We found during both 1995 and 1996 that many students experienced great difficulty getting their ideas organized and written. We are introducing weekly activities for 1997 that will focus on organization, observation, and writing skills.

Although we have always given each student a notebook for recording activities and observations, the 1997 program will include specific activities that focus on daily journal writing and recording observations after class activities and during field trips.

All field trips are being scheduled on Thursdays in 1997, so that there will be time Friday for follow-up reflection and writing activities after each field trip.

In 1996, we used the 1995 public speaking model to help the students organize their project reports. Unfortunately, this led many students to focus only on their individual portions of the group report, rather than collaborating on all aspects of the report. In 1997 we plan to provide weekly group writing activities. For each group, the report research and writing process will be divided into three weekly segments, with specific group goals to be completed by Friday each week. The public speaking model, accompanied by coaching and rehearsal, will be introduced at the start of the fourth week, after the basic group research and writing activities have been completed.

Both to provide more time for the writing activities described above, and further to develop computer skills needed for project completion, we will focus on three specific software tools:

- *Netscape* for conducting information research on the world wide web.
- *Excel* for organizing, analyzing, and visualizing numerical data.
- *Word* for report writing.
5. While we will continue to use Plato for mathematics skills development and Discover for career exploration and research, we have decided to eliminate three other computer components from the 1997 program:
   a. Internet Email. Although the students enjoy this activity, it tends to distract from rather than contribute to the other activities. In addition, the time used to learn and use an Email editor is needed for the new writing activities.
   b. Web Pages: As mentioned earlier, the plan to have the students prepare their own web pages was too ambitious for our program. The problem is not that the work was too difficult for the students, but rather that it took more time than we could allocate to that activity. We plan to continue using the world wide web as an information research tool, and Dr. Baldwin will update and maintain a web page for program. As a writing incentive, we will publish some of the best writing examples on the Exploring Our World web page.
   c. Assembly and Disassembly of the Computer: This is another example of an ambitious activity that is time consuming and requires much careful planning. In 1996 we conducted this activity in a full class format, relying on oral instructions. If we repeat it in a future Exploring Our World program, it will be more effective to use the team approach with written instructions for the reasons described earlier.
   d. Perhaps all three of these omitted computer activities can be incorporated into a future program with a computer theme.

Because of the connections among Exploring Our World, Saturday Academy, and the school system’s overall Equity 2000 program, there will be ongoing longitudinal evaluation of the effects of these programs. PGCPS has developed a database system that enables them to follow the progress of every student in the system. Participation in Saturday Academy and participation in Exploring Our World is annotated in the database records of the appropriate students. As those students progress from middle school through high school and into college, the school system can compare the academic progress and career aspirations of program participants with those of comparable nonparticipants to document the lasting effects of both programs.