Dr. Milton Dean Slaughter

(Louis Stokes) Louisiana Alliances for Minority Participation
A National Science Foundation Program

ACCOMPLISHMENTS––1996 First (Phase One) Year

The component of the **Louisiana Alliances for Minority Participation (LAMP)** program at the University of New Orleans (UNO) was established and is known as **Next Step One**. In the **Next Step One** program, summer classes and workshops (during the month of July 1996) designed to enhance foundational skills in mathematics and physics were conducted: (1) Mathematics—A pre-calculus workshop (two and a half hours per day, three days per week) was created to build and enhance foundations in algebra, trigonometry, and analytic geometry and also to sharpen problem-solving skills; (2) Physics—A new physics lecture course (called "Physics: An Overview" carrying three hours of general degree credit, two hours per day, five days per week) was created to introduce and sharpen fundamental understanding of the laws of physics which govern our everyday world; and (3) Physics—A physics workshop (algebra-based, two and a half hours per day, two days per week) was created to supplement the physics lecture course with problem solving sessions and demonstration events. The **Next Step One** program also provided the student participants with course-work tests with feedback; tutors for afternoon/evening study; an introduction to dorm life and class schedules; preparation for a more rigorous academic schedule in the fall; (summer session) tuition, room and board on the UNO campus, all textbooks required for the lecture course and laboratories, and a stipend schedule of $1,000 per academic year for four years as long as satisfactory academic progress is forthcoming. The program recruited sixteen minority UNO freshmen students, all of whom successfully completed the program including the three credit-hour physics lecture course.

ACTIVITY DESCRIPTION

Specifically, **Next Step One** focused on summer classes and workshops (during the month of July 1996) designed to enhance foundational skills in mathematics and physics: (1) Mathematics—A pre-calculus workshop (two and a half hours per day, three days per week) was created to build and enhance foundations in algebra, trigonometry, and analytic geometry and also to sharpen problem-solving skills; (2) Physics—A new physics lecture course (called "Physics: An Overview" carrying three hours of general degree credit, two hours per day, five days per week) was created to introduce and sharpen fundamental understanding of the laws of physics which govern our everyday world; and (3) Physics—A physics workshop (algebra-based, two hours and a half hours per day, two days per week) was created to

supplement the physics lecture course with problem solving sessions and demonstration events. The textbook used for the lecture course was "Principles of Physics," (sixth edition) by F. Bueche and D. Jerde. Three problem-solving books (Theory and Problems of College Algebra [by M. Spiegel], Theory and Problems of Trigonometry, second edition [by F. Ayres and R. Moyer], Theory and Problems of College Physics, eighth edition [by F. Bueche]) from the Schaum's Outline Series were utilized with great success in the accompanying mathematics and physics laboratories. Physics topics covered included vectors and balanced forces, uniformly accelerated motion, linear motion, work and energy, momentum and the pressure of gases, angular motion, rotation of rigid bodies, and the mechanical properties of matter. "Hands-on" activities included construction of hovercraft and accelerometers, graphing motion, and the gathering and treatment of data, and various machines involving acoustics, optics, electricity and magnetism, and heat.

GOALS AND OBJECTIVES

Next Step One is a program targeted to minority students underrepresented in science, engineering, or mathematics and is designed specifically to sharpen and enhance the mathematics and physics academic skills of targeted students using workshops and classes conducted on the UNO campus. **Next Step One** was designed to be an important factor in the preparation of these students for academic success in their quest for a bachelors degree in the sciences, mathematics, or engineering.

YEARLY OUTCOMES

The **Next Step One** program also provided the student participants with course-work tests with feedback; tutors for afternoon/evening study; an introduction to dorm life and class schedules; preparation for a more rigorous academic schedule in the fall; (summer session) tuition, room and board on the UNO campus, all textbooks required for the lecture course and laboratories, and a stipend schedule of $1,000 per academic year for four years. The program recruited sixteen students, all of whom successfully completed the program including the three credit hour physics course.

ACCOMPLISHMENTS––1997 Second (Phase One) Year

The primary activity of the **Louisiana Alliances for Minority Participation (LAMP)** program at the University of New Orleans (UNO) has been established and is known as **Next Step**. It is designed to be a comprehensive program with the mission of increasing significantly the number of bachelor degrees in science, engineering, or mathematics earned by minorities. It accomplishes this mission by addressing recruitment, retention needs, research experiences, and career guidance of targeted minorities. Staff personnel directly involved in the conduct of the program during the summer instructional period (laboratories, computer science class, and mathematics and physics class and workshop) included a professor of physics, a professor of computer science, two instructors (one with an M. S. in Physics and a teacher in the Orleans parish School system, and the other with a doctorate in physics), four graduate students and one undergraduate student to aid and assist **Next Step** participants. In all, forty-nine students participated (all successfully) directly in the 1997 **Next Step** program. In addition, one eminent visiting minority scientist (in the **Next Step** component called the Visiting Minority Lectureship (VML) Program) was invited to participate in the program.

A Letter of Understanding (Articulation Agreement) between **INROADS** (which promotes career development in business and industry through internships of talented minority college students), **LEAP** (**Louisiana Engineering Advancement program**--which assists middle, junior, and high school minority students in preparing for careers in engineering), **Next Step**, and the **University of New Orleans Honors and Scholarship Office** was signed Spring of 1997 with an effective date of December 17, 1996.

Briefly:

LEAP will recommend qualified candidates who have completed the **LEAP** program for internships in the **INROADS** program **INROADS** will carefully review and give every consideration to **LEAP** recommendations. **LEAP** will award full tuition scholarships for a maximum of five years to new UNO engineering majors who

- are an ethnic minority

- have participated in **LEAP** for at least one year

- have a cumulative high school grade point average of 3.0, a minimum ACT composite of 20

(SAT 950), and are ranked in the top 10 percent of his or her class

- have been accepted into the **INROADS** program. UNO agrees to award qualified **INROADS** and **Next Step One** candidate institutional scholarships ranging from $250 to the full cost of in-state tuition and books.

INROADS agrees to notify the **UNO Honors and Scholarship Office** of promising candidates by the February 15th UNO scholarship deadline. UNO will mail recommended **INROADS** candidates the scholarship application, and upon receipt of all required documents will award **INROADS** candidates - according to their merit. **Next Step One** agrees to consider qualified **INROADS** candidates who will be majoring in science, mathematics, or engineering for their summer stipend program. **INROADS** agree to recommend qualified candidates to the **Next Step One** coordinator by the published deadline date. Specific details regarding criteria for scholarship awards and internship placement will be determined in further meetings between the directors of **INROADS**, **LEAP**, **UNO Honors and Scholarships**, and **Next Step**.

ACTIVITY DESCRIPTION

Next Step

Next Step One

The primary activity of the **Louisiana Alliances for Minority Participation (LAMP)** program at the University of New Orleans (UNO) has been established and is known as **Next Step**. It is designed to be a comprehensive program with the mission of increasing significantly the number of bachelor degrees in science, engineering, or mathematics earned by minorities. It accomplishes this mission by addressing recruitment, retention needs, research experiences, and career guidance of targeted minorities. Staff personnel directly involved in the conduct of the program during the summer instructional period (laboratories, computer science class, and mathematics and physics class and workshop) included a professor of physics, a professor of computer science, two instructors (one with an M. S. in Physics and a teacher in the Orleans parish School system, and the other with a doctorate in physics), four graduate students and one undergraduate student to aid and assist **Next Step** participants. In all, forty-nine students participated (all successfully) directly in the 1997 **Next Step** program. In addition, one eminent visiting minority scientist (in the **Next Step** component called the Visiting Minority Lectureship (VML) Program) was invited to participate in the program.

In its first phase—called **Next Step One**—summer classes and workshops designed to enhance foundation skills in mathematics and physics and computer science were conducted: (1) Mathematics—A pre-calculus workshop was created to build and enhance foundations in algebra, trigonometry, and analytic geometry and also to sharpen problem-solving skills; (2) Physics—A new physics lecture course (called "Physics: An Overview" carrying three hours of general degree credit, two hours per day, five days per week) was taught to introduce and sharpen fundamental understanding of the laws of physics which govern our everyday world; and (3) Physics—A physics workshop (algebra-based and conducted in conjunction with the mathematics workshop). The **Next Step One** program provided the student participants with course-work tests with feedback, tutors for afternoon/evening study, and preparation for a more rigorous academic schedule in the Fall; The program recruited twenty-one minority freshmen and sophomore students from UNO for the lower-level class. The Program also provided all participants with a stipend of $2,500, which includes summer session tuition and all textbooks required for lecture

courses and/or laboratories. It is envisioned that in future years that similar quality workshops and classes in other STEM disciplines can added in a systemic fashion. The entire twenty-one student participants who completed **Next Step One** will be encouraged to conduct on-campus or off-campus summer research after their freshman or sophomore year in the phase two component of the program called **Next Step Two**.

Specifically, **Next Step One** freshman and sophomore component focused on summer classes and workshops designed to enhance foundation skills in mathematics and physics: (1) Mathematics—A pre-calculus workshop was created to build and enhance foundations in algebra, trigonometry, and analytic geometry and also to sharpen problem-solving skills; (2) Physics—A new physics lecture course (called "Physics: An Overview" carrying three hours of general degree credit, two hours per day, five days per week) was created to introduce and sharpen fundamental understanding of the laws of physics which govern our everyday world; and (3) Physics—A physics workshop created to supplement the physics lecture course with problem solving sessions and demonstration events. The textbook used for the lecture course was "Principles of Physics," (sixth edition) by F. Bueche and D. Jerde. Three problem-solving books (Theory and Problems of College Algebra [by M. Spiegel], Theory and Problems of Trigonometry, second edition [by F. Ayres and R. Moyer], Theory and Problems of College Physics, eighth edition [by F. Bueche]) from the Schaum's Outline Series was utilized in the accompanying mathematics and physics laboratories. Physics topics covered included vectors and balanced forces, uniformly accelerated motion, linear motion, work and energy, momentum and the pressure of gases, angular motion, rotation of rigid bodies, and the mechanical properties of matter. "Hands-on" activities included construction of hover-craft and accelerometers, graphing the motion of objects, the gathering and treatment of data, and construction of various machines involving acoustics, optics, electricity and magnetism, and heat. In addition, students were given the very useful book called Writing Your A+ Research Paper as an introduction to the techniques and methodology required to make good scientific presentations. The format and conduct of this phase one activity will also serve as the model for the future workshops in other STEM disciplines. All students completed the course successfully. Students received credit with grades based on the usual 4.0 system. Student evaluation of instructors was also conducted.

Next Step Two

The primary activity of the Louisiana Alliances for Minority Participation (LAMP) program at the University of New Orleans (UNO) has been established and is known as **Next Step**. It is designed to be a comprehensive program with the mission of increasing significantly the number of bachelor degrees in science, engineering, or mathematics earned by minorities. It will accomplish this mission by addressing recruitment, retention needs, research experiences, and career guidance of targeted minorities. In its second phase––called **Next Step Two**––preparatory undergraduate research and upper-level course work was strongly emphasized. The Program recruited ten graduates of the 1996 **Next Step One** class and one new student for a total of eleven students in a summer preparatory undergraduate research program organized as a workshop with the ultimate goal of teaching students how to prepare and deliver scientific presentations. Several well-done presentations were forthcoming from these eleven students. In addition, the Program recruited sixteen UNO juniors and seniors for an upper-level JAVA class. This **Next Step Two** junior and senior component consisted of a summer class on programming for the Internet using the JAVA language. The course was designed for students who had sufficient first and

second year computer science backgrounds and programming skills to command Internet computing technology. Several textbooks, references, and specially prepared class notes ––The Java Tutorial, An Annotated Reference, Java in a Nutshell, and Java Software Solutions were used to teach the course. In addition, students were given the very useful book called Writing Your A+ Research Paper as an introduction to the techniques and methodology required to make good scientific presentations. All students completed the course successfully. As is well-known, JAVA programs are platform neutral and very popular in the rapidly growing software industry The Program provided all participants with a stipend of $2,500, which included summer session tuition and all textbooks required for lecture courses and/or laboratories. The **Next Step Two** program also brought student participants into contact with Visiting Minority Lectureship research scientists. It is hoped that the program—through the various departmental, college, and university committees—will encourage UNO STEM departments to establish credit courses suitable for undergraduates performing research during the summer or academic year. Students (except for those in summer research and preparatory summer research programs) received credit with grades based on the usual 4.0 system. Student evaluation of instructors was also conducted. One should also note that this phase two component also supported–via tuition–one summer research undergraduate assistant (based at the Louisiana Universities Marine Consortium—LUMCON)

Visiting Minority Lectureship Program

In addition to in-class and in-lab instructional activities in the summer, during the academic year, Dr. James Turner (then at Arizona State University)–a visiting eminent minority scientist–(the first guest in the **Next Step** component called the Visiting Minority Lectureship (VML) Program) was invited to participate in the program as a teacher, invited speaker, and role model. Dr. Turner interacted well with **Next Step** students, taught and interacted with an undergraduate mathematics class at UNO, and gave presentations (on the mathematics of traffic flow utilizing a portable computer and projector) to two separate AP-Calculus classes at a predominately minority local high school, and also gave an invited seminar at UNO in applied mathematics. As a bonus, Dr. Turner (at his expense) arranged to bring six of the high school students (along with their teacher) to a five day summer workshop entitled “Adventures in Computational Science” which was held on the Florida A&M campus and at the Florida State University National Magnetic Laboratory. A second VML scientist was to visit as well, but had to cancel at the last moment. He (Dr. Vernon Cottles––Imation Company Technical Scientist) will, instead, visit UNO in late October or early November of this year. The VML program is seen as a very effective way to provide excellent “in-the-flesh” role models for **Next Step** participants. In addition, it is expected that the University infrastructure will also benefit from new and innovative ideas suggested by VML scientists–– for instance, Dr. Turner met with a number of faculty from the College of Sciences (including its Dean), the College of Engineering, as well as administrators from the Office of Academic Affairs and the Office of Sponsored Programs and Research. Other LAMP college and university members were invited to participate in the seminar, role model, and advisory activities associated with the Visiting Minority Lectureship program component of **Next Step**.

INFORMATION (REDACTED) ABOUT INDIVIDUALS INVOLVED IN LAMP ACTIVITIES

Title	FName	LName	SS#	Next Step Phase	Ethnicity
Ms.	Jade	xxx	xxx	Next Step One	Black
Ms.	Crystal	xxx	xxx	Next Step One	Black
Ms.	Bonnie	xxx	xxx	Next Step One	Black
Ms.	Silvia	xxx	xxx	Next Step One	Hispanic
Ms.	Armtrice	xxx	xxx	Next Step One	Black
Mr.	Ernesto	xxx	xxx	Next Step One	Hispanic
Mr.	Jerome	xxx	xxx	Next Step One	Black
Mr.	Larry	xxx	xxx	Next Step One	Black
Mr.	Juan	xxx	xxx	Next Step One	Hispanic
Mr.	Kevin	xxx	xxx	Next Step One	Black
Mr.	Jarrod	xxx	xxx	Next Step One	Black
Mr.	Michael	xxx	xxx	Next Step One	Black
Mr.	Rahsaan	xxx	xxx	Next Step One	Black
Ms.	Tonia	xxx	xxx	Next Step One	Black
Ms.	Martha	xxx	xxx	Next Step One	Hispanic
Mr.	Michael	xxx	xxx	Next Step One	Hispanic
Ms.	Kimby	xxx	xxx	Next Step One	Black
Ms.	Jennifer	xxx	xxx	Next Step One	Black
Mr.	Tyrus	xxx	xxx	Next Step One	Black
Mr.	Chad	xxx	xxx	Next Step One	Black
Mr.	Theron	xxx	xxx	Next Step One	Black

Title	FName	LName	SS#	Next Step Phase	Ethnicity
Ms.	Lisa	xxx	xxx	Next Step Two Workshop	Hispanic
Ms.	Shannon	xxx	xxx	Next Step Two Workshop	Black
Ms.	Kalimah	xxx	xxx	Next Step Two Workshop	Hispanic
Ms.	Martrenia	xxx	xxx	Next Step Two Workshop	Black
Ms.	Brandi	xxx	xxx	Next Step Two Workshop	Black
Mr.	Viet	xxx	xxx	Next Step Two Workshop	Pacific Islander
Ms.	Elizabeth	xxx	xxx	Next Step Two Workshop	Hispanic
Ms.	Maria	xxx	xxx	Next Step Two Workshop	Pacific Islander

Title	FName	LName	SS#	Next Step Phase	Ethnicity
Mr.	Lee	xxx	xxx	Next Step Two Workshop	Hispanic
Ms.	Rashonda	xxx	xxx	Next Step Two Workshop	Black
Mr.	Jomall	xxx	xxx	Next Step Two Workshop	Black
Mr.	Kenzie	xxx	xxx	Next Step Two (LUMCON)	Black
Mr.	Jimmy	xxx	xxx	Next Step Two	Hispanic
Ms.	Anita	xxx	xxx	Next Step Two	Black
Ms.	Candida	xxx	xxx	Next Step Two	Hispanic
Mr.	Christopher	xxx	xxx	Next Step Two	Black
Mr.	Delrick	xxx	xxx	Next Step Two	Black
Mr.	Williams	xxx	xxx	Next Step Two	Black
Ms.	Gina	xxx	xxx	Next Step Two	Black
Ms.	Samantha	xxx	xxx	Next Step Two	Black
Ms.	Christal	xxx	xxx	Next Step Two	Black
Ms.	Triege	xxx	xxx	Next Step Two	Black
Ms.	Mandi	xxx	xxx	Next Step Two	Black
Mr.	Juan	xxx	xxx	Next Step Two	Hispanic
Ms.	Jacqueline	xxx	xxx	Next Step Two	Black
Mr.	James	xxx	xxx	Next Step Two	Black
Ms.	Danielle	xxx	xxx	Next Step Two	Black
Mr.	Sirelious	xxx	xxx	Next Step Two	Black

ACCOMPLISHMENTS––1998 Third (Phase One) Year

NEXT STEP ONE

Physics 1030

Summer 1998

The ***Next Step*** program was a great success this summer. The physics component of the program, ***Next Step One*** (NSO) was conducted as a workshop style three week course. In total 14 underrepresented minority students in physics sciences participated in the program. The program consisted of a non-calculus based workshop style course in mechanics, accompanied by related laboratory work. The structure of the course was such that the Lectures were conducted in the morning hours (10:20-12:20), the problem solving session was conducted between 12:30-2:00, followed by Laboratory work in the afternoon which lasted for 2:00 hours every day for a 3-week period. Thus one can call it an intensive experience. The Lecture part of the course involved not only covering mechanics at the non-calculus level, but also introducing students to relevant mathematics.

Pre-calculus Physics

In general, the teacher of the pre-calculus based general physics course is presented with a formidable task. His students differ widely in the mathematical maturity. Many of them have a fear of mathematics. Algebraic manipulations must therefore be conducted with extreme care. These observations were evident in the NSO students as well. I found them very bright though. They diligently picked up the necessary mathematical techniques in a short period of time and applied them via many homework problems. Special emphasis was given in the class to ensure simple problems were solved in the class by taking student feedback and involving them in the problem solving. This prepared them for doing their homework by themselves.

Introduction to Mathematics

Mathematics was introduced gently. The students who lacked trigonometry were presented with alternative methods. For example, components of vectors were obtained by graphical method. Even though trigonometry was used extensively later on, students were given confidence initially by introducing them to alternative tools at the same time they were told that trigonometry will make life

easier. This made them pick up trigonometry skills and they applied them to a variety of problems and eventually they got used to them, as documented in their performance in the tests.

Level of the Course

It was assumed that NSO students deserve much better than just a watered down version of general physics. It has been my experience that these young students were as capable as those who directly take calculus-based physics. What they lacked was training in calculus and some practice in algebra and trigonometry. The majority of the basic laws of physics do not require calculus for understanding and for meaningful application to well chosen problems. The course was designed to introduce students to **the basic principles in physics** and their **important applications**. Necessary trigonometry and algebra were introduced. The primary objective was to encourage students to think logically about how things in the nature behave, involve them in problem solving, and discuss practical applications. Most of the problems involved simple algebra and some trigonometry. Students were encouraged to:

- Understand well the physical principles involved.
- Develop ability to reason out the situations
- Consistently do homework problems on related topics.

Regular problem solving was intended to enhance their understanding of the subject matter. Memorizing formulae was not essential.

Specific Goals

- First goal was to help students see that physics is a wonderfully integrated body of knowledge. In support of this goal, integration of concepts was discussed. Students were encouraged to explore the common ground between fundamental ideas in a given chapter and the fundamental ideas from previous chapters. The intent was to help students see that material studied early in the course was related to the material studied later.

- Second goal was to help students develop problem solving skills. Often students get the impression solving problems is like magic, in which equations are pulled out of thin air and given right answers. Students were encouraged to develop a reasoning step before numerically solving the problem. This step was significant and provided them with the motivation for the procedure for solving a specific problem.

- Third goal was to show that physics principles come into play over and over in our lives. To help

students understand just how physics is prevalent in our lives, we included several applications. Some of them are summarized in the table given in the next section.

Course Summary

The course covered the branch of physics called **mechanics**. Mechanics was divided into kinematics and dynamics. Kinematics consisted of the ideas needed to describe motion. For example, we studied how to describe the motion of a jet plane that starts from rest and eventually becomes airborne. The concept of acceleration was introduced to describe how the motion of the plane changes, that is, how it becomes faster and faster. Dynamics focused on what caused the motion to become faster and faster. Thus concept of force was introduced. Thus we began by describing motion with the aid of the concept of acceleration. Then we explored and built upon the relationship between acceleration and force.

After discussing acceleration and force, we considered work and energy and demonstrated that the relationship between these two concepts led to conservation of total energy. In a similar fashion, we found that the relationship between the ideas of impulse and momentum leads to the principle of conservation of momentum. The idea that certain quantities are conserved in nature provided one of the great insights in physics.

Analogies between rotational and linear motion were discussed. Concepts of angular velocity, angular acceleration, moment of inertia, torque, and angular momentum were introduced. Emphasis was given to develop the necessary equations and related examples were presented. Principles of lever, pulley, and simple machines were discussed. Some of the topics covered discussed the physics of real world applications. For example:

Topics	Applications
Acceleration	Catapulting a jet from an aircraft carrier Accelerating spacecraft
Projectile motion	Time of flight of a kick (hang time of a foot ball)
Inertia and mass	Physics of seat belt, and automobile navigation system
Newton's 3rd law	Automobile trailer breaks

Topics	Applications
Frictional forces	Tire treads
Centripetal force	Satellite in circular orbit around the earth
Work	Positive and negative reps in weight lifting
Impulse	Rocket propulsion
Angular and tangential velocity	Crack the whip––stunt in ice skating
Torque	Turntable motor

The course description of various topics covered is given in appendix A.

Testing

A mid-term exam and a final examination were conducted during the course. In addition, students were asked to do homework regularly. With consistent homework, students demonstrated steady improvement in their performance in the tests. Results of the final examination were remarkable: 12 students received A grades and 2 students received B grades. The course grades included a laboratory component.

Laboratory Component

The laboratory component was designed to give NSO students firsthand experience with some of the phenomena which are discussed in the lectures. The purpose was to familiarize them with fundamental laws in physics. Laboratory served to emphasize that contact with nature is the ultimate purpose of physics. Laboratory also demonstrated some of the physical principles behind certain every day phenomena. One item which is always surrounded by confusion and misunderstanding is the subject of errors and error analysis. Extensive instruction was given to them on the subject accompanied by a detailed handout on the error analysis (appendix B). The topics covered are summarized below:

- Error Analysis
- Measurements/calculations: using calipers & other measurements—mass, volume, density

- Density and measurements of water
- Free fall and gravity
- Springs and spring constant
- The pendulum and the acceleration due to gravity
- Static equilibrium and the force table.
- Velocity and acceleration using hovercraft.

Technology was introduced by using the Texas Instruments TI, Calculator Based Laboratory (CBL) along with the TI-82 or TI-83. Science fair style group presentations were conducted at the end of the session. Students were responsible for writing formal reports of their laboratory work. The details of the Laboratory syllabus are given in appendix C.

Student Feedback

Students gave their views about the course at the end of the every week. Three sets of student assessments are attached in appendix D. Generally student feedback is very positive. Some of the sample student comments are summarized below:

"This class will equip students with all of the basic physics principles which they need in every science major..."

"We are learning a tremendous amount of physics and the principles that we need to cope with life..."

"Overall, I feel that this class will benefit me by strengthening my mathematical skills..."

"It's an extremely interesting class. I like the diagrams and handouts that help you learn..."

"I feel that the use of pre-written transparencies and handouts eliminates profound note-taking. This lets each student concentrate on learning and not on making sure they have all of the notes..."

"This class is challenging. You would have to be dedicated and optimistic about learning..."

"My professor is dedicated and understanding. He knows his work and presents it well. The program is extremely beneficial to the students. It gives a real good entrance into physics..."

Team Effort

NSO was a real team effort under the guidance of Prof. Slaughter, the Project Director. Prof. Puri was involved in teaching classes and coordinating the laboratory effort with Mr. Blanchard, the laboratory instructor of the course. Mr. Blanchard conducted the laboratories in workshop style. He was very enthusiastic and paid attention to individual student needs. He graded their work regularly and expected them to do detailed work. Graduate students Mr. Duplessis and Ms. Kincaid conducted the problem solving sessions with great patience. Problem solving sessions were very helpful for students learning and developing confidence in their ability to do homework and subsequently do well on the tests. Mr. Martin Mayer and Mr. Brian King assisted Mr. Blanchard.

Personal Assessment

The NSO students significantly benefitted from this program because of the workshop style and the flexible nature of the course. They deserve to be complimented for their intense effort in the 3-week session. This experience gave them valuable learning experience in physics and mathematics, and helped to enhance their confidence for future college courses in physical sciences. We must monitor their progress and assist them in any way possible and help them plan their future physical science courses. From a physics point of view, most of them are ready for calculus based physics. It is hoped that NSO program will continue to assist new incoming underrepresented minority students to enter the field of physical sciences in the coming years.

Uniqueness of the program

Finally, the unique features of the NSO program are summarized below.

- Workshop style instruction-handouts given at the beginning of each class.
- Classes taught using overhead projector. Color transparencies used.
- Hands-on approach. Classroom demonstrations conducted. Student participation in problem solving encouraged.
- Related laboratory work conducted every day to reinforce learning. Technology introduced via use of CBL (Calculator Based laboratory).

Special emphasis given to error analysis, data gathering during experiments.

- Group project presentations geared to more valid student assessments and assumed improved student efforts. In addition, laboratory activities conducted with written focus on data interpretation.

Comparison with Previous NSO students

The NSO program for summer 1998 consisted of a more advanced group than the previous two years. Most of the students demonstrated more effort, knowledge and skills than previous groups. Student projects such as, finding rotational inertia using a trifilar pendulum, electrical circuits using LED and studies of refraction of light between air and water and other medium interfaces were in more detail than previously and were a good learning experience about basic physics. Such varied topics allowed an opportunity to cover a wide range of material and varied approaches to gathering data as well as the overall process of experimentation.

LAMP (*NEXT STEP*) ANNUAL REPORT 1998–––UNIVERSITY OF NEW ORLEANS

Approximately 76% of degrees awarded are in non- STEM disciplines, with 24% in STEM disciplines. This is unchanged from last year.

The ***Next Step*** program utilizes institutionalized university credit courses and specialized sections in the implementation of its mission in summer research, summer instruction, and retention of its participants. These specialized credit courses did not exist prior to the implementation of the ***Next Step*** program. The basic objective of these courses has been to equip students with basic scientific tools in a broad sense and to assist them in developing superior quantitative and analytical skills. The subject matter is designed to address a wide spectrum of students in a variety of disciplines in the basic sciences such as physics, mathematics, and chemistry and also in the biological sciences, engineering, and computer science. Students develop a deep understanding of basic skills in scientific methodology in a workshop style setting. Thus, the primary objective is to encourage students to think logically about how things in the nature behave, and involve them in problem solving and discuss practical applications of what they have learned. In summary, the main objectives of the program include:

- Developing a fundamental understanding of scientific methodology;

- Learning technology based interactive laboratory procedures;

- Developing deeper understanding of laboratory error analysis techniques;

- Learning fundamental aspects of state-of-the-art computer programming (Java programming) in an interactive fashion using the Internet;
- Developing superior laboratory report writing skills;
- Equipping students with basic research methods through hands-on scientific projects;
- Student development of quality presentation skills.

It is not known to what degree this approach is used on other campuses. NSF resources are used to *defray* the costs of running these programs.

Minority enrollment in STEM disciplines is not substantially changed from previous years, however, STEM degrees awarded has increased by approximately 25% from last year. Attribution of a quantitative nature with regard to continuation of participants' education to the graduate level to ***Next Step*** vis-à-vis other institutional activities is not possible. Qualitatively, ***Next Step*** seems to make a large, easily distinguishable impression on many participants. For some of the participants (approximately 25%), ***Next Step*** very clearly and singularly has helped them to strengthen their interest and commitment to education and to remain enrolled in school. Qualitatively, almost all of the participants' commitment to STEM disciplines seems to have been enhanced.

The ***Next Step*** program utilizes institutionalized university credit courses and specialized sections in the implementation of its mission in summer research, summer instruction, and retention of its participants. These specialized credit courses did not exist prior to the implementation of the ***Next Step*** program. Instructional costs and overhead for these programs has been borne by the University. Majors of the 1998 summer participants were in biology, chemistry, computer science, civil engineering, electrical engineering, mechanical engineering, geophysics, and mathematics. Engineering and Computer Science Majors were dominant by far.

Each student in the University has an advisor. Outside of the classroom and laboratory, ***Next Step*** staff serve primarily in the role of ombudsmen and support. Students are tracked using university computerized databases. Technology infusement is automatic in the ***Next Step*** program by design. Enhancement of student ability to understand science and mathematics fundamentals in a laboratory, classroom, and research environment is the primary goal of the program.

From the quantitative standpoint, STEM minority degrees awarded at UNO has increased by approximately 25% compared to last year. Some of this can be attributed to the retention efforts due to the ***Next Step*** program. Qualitatively, the impact of the ***Next Step*** program is high, particularly when one considers that potential AMP students who have high ACT/SAT/Essay/Interview/etc. ratings are hard to recruit because of

competition from other better funded (summer stipend) programs and the fact that consistency is yet to be established with regard to programmatic guidelines particularly in the affirmative action area.

UNO NEXT STEP Completes Its Third Successful Year

Specific university units which play key roles in the implementation of ***Next Step*** are the College of Sciences, the Associate Vice-Chancellor for Academic Affairs and Diversity Programs Office, the College of Engineering, the Office of Research and Sponsored Programs, the Graduate School, the Office of Retention, the Office of Career and Placement & Cooperative Education, the Learning Resource Center, the College Life & New Vision Program, and the University Honors Program. These offices play a vital role in that they provide the "institutional glue" that any program such as ***Next Step*** requires to be successful and truly systemic. Other University units which are equally important in that they provide requisite infrastructure are the Office of Admissions, the Office of Registration, the Louisiana Engineering Advancement Program, and the Office of Student Financial Aid. At the University of New Orleans (UNO) the primary activity of the Louisiana Louis Stokes Alliance for Minority Participation program is known locally as ***Next Step***. It is a comprehensive and unique program designed specifically to sharpen and enhance the mathematics and physics academic skills of students by using ***gateway*** workshops and classes, summer research (and preparatory summer research) experiences, in-class and in-lab instructional activities in the summer, and—during the academic year—by inviting eminent minority scientists to participate in the program as teachers, invited speakers, and scientific role models. Courses of instruction for the ***Next Step*** program are incorporated into the UNO curriculum and are designed to be an important factor in the preparation of these students for academic success in their quest for the bachelors degree of science in the sciences, mathematics, or engineering. It is a ***broad-based*** program in that it attempts to address systemically the ***chief underlying weakness*** that undergraduate minorities in ***all*** STEM disciplines typically face: ***Under-preparation in mathematics and*** physics. Students are selected using such yardsticks as academic progress and interest and attitudes toward research. The ***Next Step*** program has demonstrated that early exposure to research experiences greatly benefits student participants particularly after they conclude their sophomore year and then seek to enter more standardized summer research programs. Progress in 1998 was particularly gratifying in that **fifty students participated, five students graduated, and an unusually excellent project entitled *Visual Quantum Mechanics* was completed by Mr. Ernesto Diaz (sophomore pursuing a B.S. in Computer Science) and Mr. Michael Reed (junior pursuing a B.S. in General Studies) under the supervision of University Research Professor of Physics and *Next Step* Senior Project Coordinator Dr. Ashok Puri**. The research project used light-emitting diodes (LEDs) to prove that LEDs are a significantly more energy efficient light source than traditional incandescent lamps. In addition, Dr. Joseph A. Johnson III [Distinguished Professor of Science and Engineering, Professor of Physics, Professor of Mechanical Engineering at Florida A&M University (FAMU) Director of the Laboratory for Modern Fluid Physics and the NASA/FAMU Research Center for Nonlinear and Non-equilibrium Aeroscience] interacted with ***Next Step*** students. Professor Johnson is a Member of the Third World Academy of Sciences, a Fellow of the American Physical Society, an Associate Fellow of the American Institute of Aeronautics and Astronautics, and a Charter Fellow of the National Society of Black Physicists. He is also the 1995 recipient of the Bouchet Award of the American Physical Society.

Ernesto Diaz (Left) and Michael Reed Making a Presentation on Light Emitting Diodes

ACCOMPLISHMENTS––1999 Fourth (Phase One) Year

LAMP (*NEXT STEP*) ANNUAL REPORT 1999–––UNIVERSITY OF NEW ORLEANS

Approximately 73% of degrees awarded are in non-STEM disciplines, with 27% in STEM disciplines. This is essentially unchanged from last year.

The ***Next Step*** program utilizes institutionalized university credit courses and specialized sections in the implementation of its mission in summer research, summer instruction, and retention of its participants. These specialized credit courses did not exist prior to the implementation of the ***Next Step*** program. The basic objective of these courses has been to equip students with basic scientific tools in a broad sense and to assist them in developing superior quantitative/analytical skills. The subject matter is designed to address a wide spectrum of students in a variety of disciplines in the basic sciences such as physics, mathematics, and chemistry and also in the biological sciences, engineering, and computer science. Students develop a deep understanding of basic skills in scientific methodology in a workshop style setting. Thus, the primary objective is to encourage students to think logically about how things in the nature behave, and involve them in problem solving and discuss practical applications of what they have learned. In summary, the main objectives of the program include:

- Developing a fundamental understanding of scientific methodology;
- Learning technology based interactive laboratory procedures;
- Developing deeper understanding of laboratory error analysis techniques;
- Learning fundamental aspects of state-of-the-art computer programming (Java programming) in an interactive fashion using the Internet;
- Developing superior laboratory report writing skills;
- Equipping students with basic research methods through hands-on scientific projects;
- Student development of quality presentation skills.

It is not known to what degree this approach is used on other campuses. NSF resources are used to *defray* the costs of running these programs.

Minority enrollment in STEM disciplines is not substantially changed from previous years; **However, *STEM degrees awarded has increased by approximately 57% from last year.*** Attribution of a quantitative nature with regard to continuation of participants' education to the graduate level to ***Next Step*** vis-à-vis other institutional activities is not possible. Qualitatively, ***Next Step*** seems to make a large, easily distinguishable impression on many participants. For some of the participants (approximately 25%), ***Next Step*** very clearly and singularly has helped them to strengthen their interest and commitment to education and to remain enrolled in school. Qualitatively, almost all of the participants' commitment to STEM disciplines seems to have been enhanced.

The ***Next Step*** program utilizes institutionalized university credit courses and specialized sections in the implementation of its mission in summer research, summer instruction, and retention of its participants. These specialized credit courses did not exist prior to the implementation of the ***Next Step*** program. Instructional costs and overhead for these programs has been borne by the University. Majors of the 1999 summer participants were in biology, chemistry, computer science, civil engineering, electrical engineering, mechanical engineering, geophysics, and mathematics. Engineering and Computer Science Majors were by far dominant.

Each student in the University has an advisor. Outside of the classroom and laboratory, ***Next Step*** staff serve primarily in the role of ombudsmen and support. Students are tracked using university computerized databases. Technology infusement is automatic in the **Next Step** program by design. Enhancement of student ability to understand science and mathematics fundamentals in a laboratory, classroom, and research environment is the primary goal of the program.

From the quantitative standpoint, STEM minority degrees awarded at UNO has increased by approximately 57% compared to last year. Some of this can be attributed to the retention efforts due to the **Next Step** program. Qualitatively, the impact of the **Next Step** program is high, particularly when one considers that potential AMP students who have high ACT/SAT/Essay/Interview/etc. ratings are hard to recruit because of competition from other better funded (summer stipend) programs and the fact that consistency is yet to be established with regard to programmatic guidelines particularly in the affirmative action area.

Specific university units which play key roles in the implementation of ***Next Step*** are the College of Sciences, the Associate Vice-Chancellor for Academic Affairs and Diversity Programs Office, the College of Engineering, the Office of Research and Sponsored Programs, the Graduate School, the Office of Retention, the Office of Career and Placement & Cooperative Education, the Learning Resource Center, the College Life & New Vision Program, and the University Honors Program. These offices play a vital role in that they provide the "institutional glue" that any program such as ***Next Step*** requires to be successful and truly systemic. Other University units which are equally important in that they provide requisite infrastructure are the Office of Admissions, the Office of Registration, the Louisiana Engineering Advancement Program, and the Office of Student Financial Aid.

Sample Programmatic Memorandum

DATE: October 1, 1999

TO: Dr. Gregory M. St. L. O'Brien

Chancellor

FROM: Dr. Milton D. Slaughter, University Research Professor,

Co-Principal Investigator, LSLAMP

Department of Physics

SUBJECT: LSLAMP GOVERNING BOARD MEETING

The Louis Stokes Louisiana Alliance for Minority Participation Governing Board met at Southern University in Baton Rouge on Thursday, September 23, 1999. In attendance were representatives of the Chancellors and Presidents of the Alliance schools, Dr. Savoie, and Alliance Campus Coordinators. A number of items were discussed:

Based upon preliminary data, the Alliance will probably meet its fourth and fifth year bachelors degree goals, thus helping to increase the probability that the NSF (National Science Foundation) will approve Phase Two (a five year continuation) of the present award. I wish to note that UNO minority STEM (science, technology, engineering, and mathematics) bachelors degree production (Summer 1998––Spring 1999) increased by 57% from last year—This means that UNO has almost met its NSF goal of doubling production of minority STEM bachelors degrees in just four years;

The Board Regents will approve cost sharing for Phase Two at the same (current) level ($500K per year) if the NSF approves phase two;

Letters of Commitment (addressed to the Board of Regents) have been received from some of the Alliance CEOs including one from UNO. Another Letter of Commitment will be requested from Alliance schools to be addressed to the NSF;

Establishment of similar LSLAMP organizational structures at Alliance schools was discussed. Essentially, Dr. Bagayoko (a Co-PI and Project Principal), continues to push his Timbuktu Academy model (very dear to him) as an Alliance model. I am adamantly against such a universal model––"What's

good for the goose is not necessarily good for the gander"—is appropriate here; "Been there–Done that" also comes to mind. The Alliance schools are very unique and distinct from each other in myriad ways;

The new Gates Millennium Scholars Program (GMSP) was discussed. I addressed the Board on two items: (1) The GMSP; and (2) Low cost Web video techniques used in the **Next Step** Program at UNO. In my opinion, the GMSP has the potential to be the most important program of its kind (including all government sponsored programs). It almost certainly will increase dramatically the number of minority STEM doctorate recipients in the next decade. Bill Gates (Microsoft) said in a press release that one of the motivating factors in his decision to donate one Billion dollars to establish the GMSP was the fact that nation-wide, only one African-American physics doctorate was produced last year. I illustrated the potential importance of being able to produce video suitable for the World Wide Web and also for classroom instruction not only at very low cost but also independent of expensive commercial or university facilities. Indeed, the ***Next Step*** 99 cdrom (containing more than a hour of very informal student presentations) that I asked Dr. Murphy to give to you last Friday was completely produced using only off the shelf software, a Gateway computer, and a consumer grade analog camcorder. If one goes to the web page, www.PhysicsResearch.net, one will find a link where one can watch a streaming video of the same presentation. The streaming video file represents a compression factor of roughly a 1000 relative to an .avi or .mov file of the same presentation. What is novel and new here is the fact that one can make short––ten, fifteen, twenty, etc. minute––instructional (research, etc.) video productions very quickly, dynamically, and at very little cost except for one's time. These techniques have been available for quite some time, but only now has it been possible for the consumer or layman or faculty member to take full advantage of the technology at low cost.

If you have any questions, please do not hesitate to contact me at 3-6341 or at mslaught@uno.edu . I am also enclosing additional copies of the ***Next Step*** 99 cdrom for Provost Paradise and Vice-Chancellor Laska and another for your perusal. In the near future, I will send copies of the cdrom to Dr. Savoie and other Alliance governing Board members and campus coordinators. LSLAMP staff already have copies. I will also post on the Web, a complete description of the materials and procedures required to produce one's in-house video productions. **I might add that our external review panel was quite pleased with these developments.**

ATTACHMENT:

Additional supporting materials:

3 ***Next Step*** 99 CDROMS

Gates Millennium Scholars Program Material

ACCOMPLISHMENTS––2000 Fifth (Final–Phase One) Year

The primary LAMP activity program at UNO is known as ***Next Step***. It is designed to be a comprehensive program (primarily in the summer) with the mission of increasing significantly the number of bachelor degrees earned by minorities in STEM. It accomplishes this by addressing research experiences, retention needs, recruitment, stipend support, and career guidance of targeted minorities. Staff personnel directly involved in the conduct of the program during the summer instructional period (laboratories, mathematics and physics class, and workshop) included two professors of physics and an instructor with an M. S. in Physics and who is also a teacher in the Orleans Parish School system. In its first phase--called ***Next Step One***—a combination summer class and workshop designed to enhance fundamental skills in mathematics and physics was conducted: (1) A pre-calculus mathematics workshop was created to build and enhance foundations in algebra, trigonometry, and analytic geometry and also to sharpen problem-solving skills; (2) A physics lecture course (called "Physics: An Overview" carrying three hours of general degree credit) was taught to introduce and sharpen fundamental understanding of the laws of physics which govern our everyday world; and (3) A physics workshop (algebra-based) was conducted in conjunction with the mathematics workshop. In its second phase–called ***Next Step Two–*** preparatory undergraduate research and upper-level course work in physics and mathematical physics with an emphasis on vector calculus was strongly emphasized. This ***Next Step Two*** junior and senior component consisted of a summer class carrying 3 credit hours of general degree credit. The course was designed to provide fundamental skills in vector calculus and techniques necessary for all STEM majors.

The primary activity of the Louisiana Alliances for Minority Participation (LAMP) program at the University of New Orleans (UNO) has been established and is known as ***Next Step***. It is designed to be a comprehensive program with the mission of increasing significantly the number of bachelor degrees in science, technology, engineering, or mathematics earned by minorities. It accomplishes this mission by addressing recruitment, retention needs, research experiences, stipend support, and career guidance of targeted minorities.

48 students participated in the 2000 ***Next Step*** (NS) program as in-class students. In ***Next Step One*** (NS1) (17 students)––a combination summer class and workshop designed to enhance fundamental skills in mathematics and physics was conducted: (1) A pre-calculus workshop was created to enhance algebra, trigonometry, analytic geometry, and problem-solving skills; (2) A physics lecture course (three hours credit) was taught with the goal of introducing the fundamental laws of physics; and (3) A physics workshop was conducted in conjunction with the mathematics workshop. The NS1 program provided participants with course-work tests, feedback, tutors, and preparation for a more rigorous academic

schedule in the Fall; The program recruited minority freshmen and sophomore students from UNO for the lower-level class. Participants in NS1 will be encouraged to conduct summer research after their freshman or sophomore year in the phase two component of the program called ***Next Step Two*** (NS2). In its second phase—called (NS2) (31 students)—preparatory undergraduate research and upper-level course work in physics and mathematical physics (and in particular–vector calculus) was emphasized. The Program provided all participants with a stipend of approximately $2,000. Some Program Highlights: (1) Ms. Akita Patterson completed her first year as an elected Vice President of UNO Student government; (2) Ms. Robin LaSalle was received an internship at the Stanford Linear Accelerator Center; and (3) Dr. Vernon M. Cottles of the Imation Corporation gave a seminar to UNO faculty and NS students and also met with NS students He also visited an African-American college preparatory school in New Orleans under the auspices of the NS program. While it is still too early from a statistical point of view to judge the absolute effectiveness of the NS program with regard to graduation rates, it is anecdotally crystal clear that its effect is a positive one. Nine of our students graduated over the past year and we expect a "bumper crop" of graduates next year.