

LIST OF ACTIVITIES BEARING ON MENTORING

Systemic Mentoring at the Timbuktu Academy

(The formula for student retention, on-time graduation, quality enhancement, the development of professionalism, and the gateway to graduate school and to competitiveness)

As explained in the literature (Education, Vol. 115, No. 1, pp. 31-39, 1994), systemic mentoring is the **coupling** between *quality teaching and quality learning* on one hand, and between *quality teaching and quality research* on the other. Student retention, on-time graduation, and attendance and success in graduate school, according to the integrated law of human performance, are not “magical events.” They are natural consequences of exposure to the proper content and skill, in the proper sequence, at the adequate scope and depth, in a fashion that guarantees adequate practice—including research participation, as shown in the aforementioned article. Consequently, systemic mentoring, woven into the instructional, research, and service fabric of departments and units, is the hallmark of the Timbuktu Academy (<http://www.phys.subr.edu/timbuktu.htm>). We summarize below the ten (10) commandments of the *systemic mentoring model of the Timbuktu Academy*, as per its brochure that is available at the noted web site. **These activities are keyed to the paradigm of the Timbuktu Academy.**

1. Financial support is provided to the scholars from *a variety of sources* – guidance, monitoring, and other components of systemic mentoring that guarantee the use of the resulting "time dividend" for studies, research, and related enrichment activities on a full time basis. Continued support from the Academy, for a scholar, requires full time "studying and research" during the academic year. The diversified funding base for the scholars include the TOPS, the Federal Student Financial Aid, limited support from LS-LAMP and other scholarship and fellowship sources, including unit and institutional funds.

2. Communication skill enhancement - A host of listening, speaking, reading, writing and related activities are aimed at developing the mastery of the applicable language (English), a vehicle of thought. This activity entails vigorous exposure to technical communication as provided for in “*Writing for Success*” (1998, McGraw-Hill Companies, pp. 135-176 and pp. 212-215).

3. Comprehensive, Scientific Advisement - The proper sequencing of courses is treated with the utmost care. Indeed, the internal rigidity (or taxonomic structure) of science, engineering, mathematics, and technology (SMET) disciplines requires this approach. Empowering the learner is a central aim of mentoring. This empowerment includes grasping the power law of performance $[(T=A+B(N+E) -P)]$ and its extension, the integrated law of human performance (ILP); understanding and applying cognitive condensation for meta-and mastery-learning; and knowing a few time-tested quotes like the Jaime Escalante Equation, its corollary, and others. The Uri Treisman discovery in calculus, at Berkeley, is an indirect support of the power law of performance (the degree of alertness and of practice is expected to be higher in a group or cooperative learning environment). PORTFOLIO PER STUDENTS; MANDATORY MEETING FOR ADVISEMENT

4. Tutoring - Tutoring by faculty members and particularly by peers will continue to be available to the students or scholars who need it. (In fact, regular tutoring areas are often taken over by self-organized study groups!) Tutoring is for excellence, not for remediation; it is

to address holes in a background and to reinforce known essentials; it is not a sign of any lack of intrinsic smartness, so says the power law of human performance, but rather a wise recognition of the internal rigidity of SMET fields. Incidentally, tutoring by scholars also promotes their communications skills and sense of self-worth while they review materials (so says the ILP)!

.5. Generic research activities - Rigorous literature searches are conducted by the scholars on several subjects. They master sophisticated search algorithms, electronic searches, and related iterations. The scientific literature is an unlimited source of research questions! Refereed literature is the standard for SMET disciplines. Current awareness readings are part of these generic research activities—to follow developments as they occur. So is the development of communication (WRITING) skills germane to research. (Semester Reports, Summer Reports, and Report on Special Lectures or Seminar Sessions)

6. Specific research project execution by the scholars of the Timbuktu Academy, Faculty members and researchers at Federal and industrial laboratories serve as research supervisors and mentors to scholars, year round. According to the integrated law of human performance, research experiences should prepare for graduate studies and for productive research careers. Seeking summer research opportunities on-line, at conferences, and through visits to various laboratories and agencies is one requirement for a mentoring program. Assisting scholars to apply vigorously and professionally for these opportunities and maintaining adequate files on each scholar, partly for the purpose of writing substantial (as opposed to general and vague) recommendations are some tasks for mentors to accomplish. Please see the section on achievements for details the research participation of the scholars.

7. Development of a professional culture - Every scholar is exposed to discussions that explore the dimensions of *ethics in science*. Immersion in a professional culture demands a regular reading of technical journals and appropriate magazines of professional societies, conference attendance, and collaboration with others. Current awareness needs no explanation in an era of information explosion. Professional practices and standards are set and seen in publications, *seminars*, and at conferences. As for the need for and value of collaboration, we simply assert that not one individual has built or operated a nuclear submarine, an aircraft carrier, or a space shuttle alone!

The **Weekly Seminar** plays a crucial role in the development of a professional culture. It repeatedly emphasizes the need for superior academic performance and provides a clear road map for any student to make a genius out of himself. Topics that are discussed in a variety of different ways include “*The Integrated Law of Human Performance*”, “*How to Study Successfully*”, “*Problem-solving Proficiency by Design*”, *the scientific method in practice*, *ethics*, and the quintessential importance of communication skills. At the weekly seminars, the presentations are made by eminent guest speakers, faculty, and Timbuktu Academy scholars.

In addition to the seminars, the Academy scholars are required to attend and make research presentations at **local, state and national conferences (Statistics)**. The Timbuktu Academy also conducts summer bridge programs for pre-college students. Every summer the **Summer Pre-College Quiz Bowl** is the culmination of these programs. Its importance resides in the *celebration of academic excellence*, intellectual prowess and the promotion of scholarship as an integral part of the professional value system.

8. Development or Enhancement of Communication, Computer, and Technological Skills - The mastery of productivity tools, including word-processing, spreadsheets, database, graphics, other applications, and scientific programming (C++, FORTRAN, etc.) are needed. Advanced exposure has to include a programming language. (The

need for these activities is given by the environments to which the students are destined, i.e., graduate schools and the global market). Given the primacy of languages as vehicles of thought (i.e., paradigm of the Timbuktu Academy), efforts are devoted, *year-around*, to the development or enhancement of communication skills (including technical writing).

9. Monitoring - With monitoring, throughout the semester, potential problems are avoided before they become permanent Fs. Preventive measures include concentrated efforts, extra-tutoring, and the last resort, dropping a course. The former two steps are best when they are taken as early as possible. The latter step is not an available option past a certain date after mid-term! The monitoring of research participation and performance is critical for another reason: *the development or reinforcement of non-cognitive skills that undergird success (self-discipline, hard work, assiduity, working well with others, etc.)*. Monitoring and evaluation are part of a professional environment, without them, who will know what a beautiful job a scholar has done! (Reference the Portfolio)

10. Guidance to Graduate School - It begins in the freshman year (or earlier) and includes research experiences, conference attendance, *GRE preparation* starting the freshman year, and opportunities for financial support for graduate studies. Placement in graduate programs follows steps similar to those for summer placement. The number and the extent of the opportunities depend on the cumulative grade point average for the BS degree, the courses taken, research experiences and results, and the GRE score. These measures of preparedness for graduate studies are also indicators of self-discipline, focus, the quality and scope of exposure to subject content, and research skills. They are, hence, indicators of the likelihood that a prospective graduate student will pass the required courses and will make contributions in research! In addition, graduate preparation will include an understanding of the non-academic factors that are critical to success in graduate school. Emphasis will be placed on the establishment of a seamless transition to graduate school.

The rigorous reasons for the above detailed description of the components and activities of our systemic mentoring are implicitly in the Section above on our understanding of the issues. The continued implementation, expansion, and institutionalization of these activities, as they apply to minority students and others, are core activities of the Timbuktu Academy. *We should add the formal institutionalization of systemic mentoring in SMET departments (1997) and all departments (1998) at SUBR.*

It is important to note that these steps address all four (4) key transition or articulation points. The latter are high school to college SMET, college undecided to college SMET, community colleges to four-year college SMET and college SMET to graduate and Ph.D. programs in SMET. The working rationale that partly explains the success of the above model includes the fact that transition activities not coupled with systemic mentoring (structured organization) do not have lasting effects.

The above steps for systemic mentoring are rigorously applied from middle school to Graduate school, with obvious adjustments for the middle school. They are followed to the letter, as noted above, for undergraduates and graduate students. For high school students, instead of preparing for the GRE, we prepare for the ACT/SAT. We guide in the course taking needed for successful enrollment in Science, Mathematics, Engineering, and Technology (SMET) disciplines. The various subprograms where the above activities are carried out include:

CONFERENCE PARTICIPATION
TIMBUKTU ACADEMY
SOUTHERN UNIVERSITY AND A & M COLLEGE
BATON ROUGE, LOUISIANA 70813

2001

DESCRIPTION	LOCATION	DATES
National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE) <i>Ten (10) pre-college scholars attended and participated in the Quiz Bowl</i>	Annapolis, Maryland	April 9 - 13, 2001
National Conference of Black Physics Students (NCBPS) <i>Fifteen (15) undergraduate scholars attended.</i>	Stanford University Palo Alto, California	March 29 - April 1, 2001
National Society of Black Engineers (NSBE) <i>Ten (10) undergraduate scholars attended.</i>	Indianapolis, Indiana	March 14 - 18, 2001
American Physical Society (APS) March Meeting <i>One (1) graduate scholar attended and made an oral technical presentation.</i>	Seattle, Washington	March 12 - 16, 2001
NAFEO High Tech Expo <i>Five (5) undergraduate scholars attended. Three (3) scholar made a technical presentation.</i>	Washington, DC	March 22 - 24, 2001
DOE/EPSCoR-LS LAMP SEM Research Conference <i>Forty-eight (48) undergraduate scholars attended. Twelve scholars made technical presentations. One graduate scholar made an oral technical presentation.</i>	New Orleans, Louisiana	February 11 - 13, 2001

2000

DESCRIPTION	LOCATION	DATES
National Society of Black Engineers Fall Regional Conference (NSBE) <i>Forty (40) undergraduate scholars and/or affiliate scholars attended.</i>	Iowa State University Ames, Iowa	October 27 - 29, 2000
DOE/EPSCoR-LS LAMP SEM Research Conference <i>Thirty-three (33) undergraduate scholars attended. Three scholars made technical presentations.</i>	Baton Rouge, LA	March 25 - 28, 2000
National Society of Black Engineers (NSBE) <i>Nine (9) undergraduate scholars attended.</i>	Charlotte, NC	March 22 - 26, 2000
National Conference of Black Physics Students (NCBPS) <i>Seven (7) undergraduate scholars & 2 graduate (GREAT) scholars attended.</i>	North Carolina A & T Greensboro, NC	March 16 - 19, 2000
NAFEO High Tech Expo <i>Six (6) undergraduate scholars attended. Each scholar made a technical presentation.</i>	Washington, DC	February 14 - 16, 2000

1999

DESCRIPTION	LOCATION	DATES
Second Annual International Conference on New Theories, Discoveries, and Application of Superconductors and Related Materials (NEW³SC-2) <i>One (1) graduate (GREAT) scholar, LaShounda Torrence, attended and made a technical presentation.</i>	Las Vegas, NV	May 30 - June 4, 1999
National Organization of Black Chemists and Chemical Engineers (NOBCCChE) <i>Two (2) undergraduate scholars attended.</i>	San Diego, CA	April 6 - 10, 1999
American Physical Society Centennial Celebration <i>Eighteen (18) undergraduate scholars attended.</i>	Atlanta, GA	March 21 - 25, 1999
National Conference of Black Physics Students (NCBPS) <i>Seven (7) undergraduate scholars & two (2) graduate (GREAT) scholars attended.</i>	University of California Berkeley, CA	March 11 - 14, 1999
DOE/EPSCoR-LS LAMP SEM Research Conference <i>Thirty-four(34) undergraduate scholars attended..</i>	Baton Rouge, LA	March 4 - 6, 1999
Deep Ice/NSF Site Visit <i>One (1) graduate (GREAT) scholars attended.</i>	Berkeley, CA	February 19 - 24, 1999

1998

DESCRIPTION	LOCATION	DATES
National Conference of Black Physics Students (NCBPS) <i>Three (3) undergraduate scholars attended.</i>	University of Kentucky Lexington, KY	March 4 - 7, 1998
American Physical Society (APS) March Meeting <i>One (1) graduate (GREAT) scholar attended.</i>	Los Angeles, CA	March 18 - 21, 1998
National Society of Black Engineers <i>Two (2) undergraduate scholars attended as Torch Bearers.</i>	Anaheim, CA	March 25 - 29, 1998
American Society of Electrical Engineers Conference <i>Three (3) undergraduate scholars attended.</i>	New Orleans, LA	March 25 - 27, 1998
National Organization of Black Chemists and Chemical Engineers (NOBCCChE) <i>Two (2) undergraduate scholars attended.</i>	Dallas, TX	April 14 - 17, 1998

1997

DESCRIPTION	LOCATION	DATES
National Council on Undergraduate Research Conference <i>6 undergraduate students attended.</i>	Austin, TX	April 23 - 26, 1997

Eleventh Annual Julia M. Martin College of Sciences Symposium <i>Twenty-eight (28) scholars participated and six (6) scholars made technical presentations.</i>	Baton Rouge, LA	April 16 - 18, 1997
NAFEO High Tech Expo <i>Four (4) undergraduate scholars attended. Each scholar made a technical presentation.</i>	Washington, DC	April 10 - 13, 1997
Beta Kappa Chi/National Institute of Health/Brookhaven Semester Program 54th Annual Joint Meeting <i>Dr. Bagayoko, Mrs. Simms and Twenty-three (23) scholars attended.</i>	Baton Rouge, LA	April 3 - 6, 1997
National Society of Black Physicists (NSBP) Conference <i>Three (3) scholars attended. Each scholar made a technical presentation.</i>	Lawrence Berkeley National Laboratory Berkeley, CA	March 27 - 29, 1997
National Society of Black Engineers Conference <i>One (1) undergraduate scholar attended.</i>	Boston, MA	March 25 - 30, 1997
24th Annual National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE) Conference <i>Two (2) undergraduate scholars attended and one scholar made a poster presentation.</i>	Orlando, FL	March 23 - 29, 1997

1997
(Continued)

DESCRIPTION	LOCATION	DATES
National Conference of Black Physics Students (NCBPS) <i>Sixteen (16) undergraduate scholars attended and four (Katrina Carter, Louis Beathley, LaKindra Francis, and Osaze Scott) made technical presentations.</i>	Massachusetts Institute of Technology (MIT) Boston, MA	February 27 - March 1, 1997
71st Annual Meeting of the Louisiana Academy of Sciences <i>One (1) undergraduate scholar, LaKindra Francis, participated and presented at the conference.</i>	Louisiana State University (LSU) Alexandria, LA	February 6 - 7, 1997

1996

DESCRIPTION	LOCATION	DATES
DOE/EPSCoR SEM Research Conference <i>Dr. Bagayoko and forty-eight (48) undergraduate scholars (under the supervision of Mrs. Karen Simms) participated. Seven (7) scholars made poster presentations. Six scholars made finalists for the oral presentation, and two of them won 1st (Katrina Carter, Physics) and 2nd (Tracee Thomas, Chemistry) place.</i>	New Orleans, LA	November 25 - 26, 1996

NSF AMP Research Conference <i>One (1) undergraduate scholar participated.</i>	Tallahassee, FL	July 20 - 22, 1996
21st National Conference on Blacks in Higher Education (NAFEO) <i>Six (6) undergraduate scholars participated.</i>	Washington, DC	April 18 - 21, 1996
National Organization of Black Chemists and Chemical Engineers (NOBCCChE) <i>Ten (10) undergraduate scholars participated.</i>	Detroit, MI	April 9 - 12, 1996
4th Annual HBCU Minority Symposium <i>Two (2) undergraduate scholars participated.</i>	Greensboro, NC	April 1 - 4, 1996
National Society of Black Engineers Conference (NSBE) <i>Dr. Bagayoko and three (3) undergraduate scholars participated. Dr. Bagayoko made a technical presentation at the NSBP Conference on "3d Impurities in Aluminum: New Developments."</i>	Nashville, TN	March 27 - 31, 1996
American Chemical Society (ACS) National Meeting <i>Thirteen (13) undergraduate scholars participated.</i>	New Orleans, LA	March 22 - 28, 1996
American Physical Society (APS) March Meeting <i>Two (2) undergraduate scholars participated.</i>	St. Louis, MO	March 22 - 23, 1996
Regional Conference of the National Organization of Black Chemists and Chemical Engineers (NOBCCChE) <i>Fifteen (15) scholars participated. One scholar, Deanna Jones, presented a poster.</i>	Louisiana State University (LSU) Baton Rouge, LA	February 24, 1996
National Conference of Black Physics Students (NCBPS) <i>Twenty-six (26) undergraduate scholars (Physics majors) participated. One (1) scholar, Robert Smith, made a technical presentation.</i>	Fisk University Nashville, TN	February 15 - 18, 1996

1995

DESCRIPTION	LOCATION	DATES
4th National Diversity Conference (Organized by NSF) <i>Five (5) scholars participated. Each scholar made a technical presentation.</i>	Washington, DC	Fall, 1995
47th Southeast/51st Southwest Joint Regional Meeting of the American Chemical Society (ACS) <i>Five (5) undergraduate scholars participated.</i>	Memphis, TN	November 29 - December 1, 1995
National Technical Association (NTA) Conference <i>One (1) undergraduate scholar participated.</i>	Philadelphia, PA	October 20 -21, 1995
National Conference of Undergraduate Research (NCUR) <i>Four (4) undergraduate scholars participated.</i>	Albany, NY	April 19 - 23, 1995

National Organization of Black Chemists and Chemical Engineers (NOBCChE) <i>Three (3) undergraduate scholars participated.</i>	Los Angeles, CA	April 17 - 23, 1995
American Chemical Society Conference <i>Four (4) undergraduate scholars participated.</i>	Anaheim, CA	April 1 - 4, 1995
NAFEO High Tech Expo <i>Seven (7) undergraduate scholars participated. Each of the scholars made technical presentations.</i>	Washington, DC	March 16 - 19, 1995
National Conference of Black Physics Students <i>Five (5) scholars participated.</i>		Spring, 1995

1994

DESCRIPTION	LOCATION	DATES
3rd National Diversity Conference (Organized by NSF) <i>Five (5) undergraduate scholars participated. Each of the scholars made a technical presentation.</i>	Washington, DC	October 28 - 30, 1994
National Society of Black Physicists Conference <i>Five (5) undergraduate scholars participated and two (2) made technical presentations.</i>	Newark, NJ	April 20 - 23, 1994
American Physical Society (APS) March Meeting <i>Three (3) undergraduate scholars participated and they made two technical poster presentations.</i>	Pittsburg, PA	March 20 - 25, 1994
Regional Conference of the American Society of Engineering Education /Gulf Southwest Section <i>Five (5) undergraduate scholars participated and one made a technical presentation.</i>		March 22 - 25, 1994
National Conference of Black Physics Students (NCBPS) <i>Thirty-eight (38) scholars and students attended and two (2) made technical presentations.</i>	Atlanta, GA	February 10 - 13, 1994