

Partnership in Academic Communities (PAC) Highlights

In 1994, Florida International University (FIU) in collaboration with Miami-Dade County Public Schools (MDCPS) established a program called the Partnership in Academic Communities (PAC). The program serves the Miami Southridge Senior High School and its feeder middle schools—Cutler Ridge, Mays, and Richmond Heights. Historically, the request for PAC came from MDCPS in January, 1994. From that date forward, several faculty members worked constantly with the Superintendent, Deputy Superintendent, and members of the Advanced Academic Programs Department, starting with intensive planning and opening the first classes for seventh graders during the fall 1994. The first 12th grade class graduated in June 2000. **The PAC program was recognized by the National Council of the Great City Schools in 2003 by winning the Excellence in Urban Education Award.**

PAC, an unique program, housed on the FIU campus, is designed to increase achievement of underrepresented minority students in mathematics and science with the goal of university admission upon graduation from the Miami-Dade County Public Schools. The PAC program offers students from priority schools the opportunity to study in a low risk, high-intensity environment on a university campus, utilizing the classrooms and laboratories associated with an institution of higher learning. A significant feature of the program is the use of technology as a tool for learning and investigating mathematics and science. Another important feature of the program is that FIU provides university scholarships for qualified students upon graduation from PAC and acceptance to FIU.

Each day selected high school students from Southridge Senior High School, and middle school students from Cutler Ridge, Mays, and Richmond Heights Middle Schools arrive by bus at FIU's University Park Campus where they spend half the school day taking mathematics, science, technology, and research classes. The PAC program currently has about 75 students, in seventh through twelfth grades, being taught by several master teachers from Miami-Dade County Public Schools with input from FIU faculty. The teachers that are new to PAC have the opportunity to see high quality teaching and practice research-validated instructional strategies with meaningful curriculum. The master teachers strive to involve students in an integrated mathematics, science and technology curriculum that is rooted in problem-based learning and to share their skills with teachers new to the profession. They use research courses to further the PAC students understanding of what it means to actually do science and math. When the PAC classes are over for the day, students return to their home schools for their other academic and elective classes.

The PAC program has been in operation for fifteen years. The first graduating classes have produced nurses, engineers, a computer graphics specialist, writers, business associates, forensic scientists, an environmentalist, police officers and military personnel, federal agents, and a host of others. Recent PAC graduates are working their way through university and include students intent on medical school, law school, forensic science, sports management, clinical psychology, and education. There are also PAC graduates that are attending, were accepted to or have graduated from other colleges, including Brigham Young University, Virginia Polytechnic Institute, Duke, Princeton, University of Central Florida, and the University of Florida. See document titled PAC Graduate Data for information regarding the graduation and university attendance rates.

Since the inception of the FCAT graduation requirements no PAC students have failed to pass the math portion of the exam by the end of the eleventh grade year. In fact, the vast majority of PAC students pass the math portion of the FCAT in the tenth grade. In the past four years, only one student has failed the math portion of the FCAT in the tenth grade. Also, upon entering high school, PAC students enroll in challenging courses. All students take honors math and science courses throughout high school and a large number take AP courses. Now nearly all of the PAC high school juniors and seniors are enrolled in at least one AP course and many take two or more. In the last four years, 46% of PAC graduates were among the top 25 students in their graduating class. Beyond the academic accomplishments, the PAC program has created a lifestyle that includes community service, academic outreach, and a sense of belonging. Students and parents volunteer their time to participate in events such as the Heart Awareness Night, Math and Science Academic Night, Saturday School, and the PAC Summer Academy. However, PAC's most remarkable accomplishment is the high school graduation rates. Over the past 10 years of graduating classes, PAC has achieved the following graduation statistics.

Of the students that start 9th grade with PAC:

96.4% graduate from high school

89.8% graduate from PAC

Of the students that make it to the 12th grade in PAC

99% graduate from high school

94% graduate from PAC

66% get accepted to a university and are awarded a scholarship

78% attend a postsecondary institution

It is also important to note that aside from meeting at least three at-risk criteria, students recruited for PAC have stanines of 4's, 5's, 6's, and some 7's. In other words, upon entering PAC in the 7th grade, the students are ranked as having average ability. Many of the students that have participated in the program would never have graduated from high school, and college would have been even less attainable, either academically or financially. The vast majority of these students are capable of succeeding in school, but for many reasons have been caught in a cycle of low academic achievement, no expectation of college admission, and little or no expectation of careers and good paying jobs. In fact, they often encounter situations that make success in school a struggle: single parent households with low incomes; responsibility for the care of younger siblings; the necessity of working to supplement the family income; ambivalence toward education at home and in their community. Many of them have experience with addicted family members, abusive relationships, or friends or family in prison. Some of the PAC children live with relatives because both parents are deceased. For nearly half of kids like this, the idea of attending a university is, at most, a flicker of a dream lost somewhere between middle school and dropping out of high school. The PAC program offers students an opportunity to achieve academic success, build self-esteem, and make college a reality.

The PAC program has another worthwhile dimension: it serves as a training ground for FIU pre-service teachers (undergraduate and graduate students who are teachers-in-training) who work with and assist PAC teachers, FIU faculty and the PAC students, thereby gaining valuable real-world classroom experience. Through grants from the American Physical Society, the PhysTEC project, and the National Science Foundation, the Noyce Foundation Scholarship Program, select FIU undergraduate education students have the opportunity to become Learning Assistants (LA). These projects provide students interested in exploring the teaching profession money for additional education in exchange for work in the classroom. Many are mathematics, physics or chemistry education majors, with some studying other education fields or pursuing degrees in the disciplines. This year we anticipate our first Earth Science Education major to join the LA program in the fall. The objectives of the projects include preparing teachers as mentors for underserved students, increasing minority teacher recruitment, and developing new education practices (especially in the areas of math, science, and technology) specifically designed for urban settings.

The PAC, PhysTEC and Noyce, housed in the Curriculum & Instruction Department, Physics and Mathematics departments, respectively, seek to develop a learning community among undergraduate and graduate students, Miami-Dade County Public Schools master teachers, middle and secondary school students, and university faculty. The LAs participate in an academic and social support network for the middle and high school students in the PAC program. They work with students in classroom and one-on-one settings, can serve as tutors in Saturday Academy sessions, and oversee the academic activities of six (6) to eight (8) PAC students. Student participating in the LA project here at FIU serve as tutors, teaching assistants, and mentors. Teaching teams consisting of FIU faculty members, Miami-Dade County Public Schools (MDCPS) master teachers, LA undergraduate and graduate students, and College of Education graduate students develop hands-on classroom assignments, team-teaching techniques, activity demonstrations, and engage in planning sessions, workshops and discussion groups. The LA experience in PAC contributes to the students' development as teachers by training them in curriculum and instructional strategies and methodologies, and giving them the opportunity to practice their newly learned skills in a safe and supportive environment. The undergraduate students also gain experience using technology to teach and learn mathematics and science.

The PAC program bolsters the self-confidence and academic performance of the students. A strong support system of teachers and university faculty assures that PAC students receive the quantity and quality of support - tutoring, mentoring, individual attention and group interaction - to make the learning environment and experience enriching and successful. The LA students are well-prepared for their future teaching roles.

Current PAC FIU UP Community Members

FIU Tenured/Tenure Line Faculty: George O'Brien, Director
Maria Fernandez
Eric Brewe
Cengiz Alacaci (on leave in Turkey)
Laird Kramer

Former PAC Lead Teacher/FIU Doctoral Student & Secondary Programs Coordinator/Former PhysTEC Program Coordinator: Leanne Wells

PAC Teachers: Giselle Jorge, Lead Teacher, Science Teacher
Current AY Teaching: 9th grade Honors Biology, 10th grade Honors Chemistry, 9th grade Research, 10th grade Computers, 7th grade Pre-Algebra

Degrees: Ed.D. FIU Currently enrolled in C & I (Science Education)
M.S. FIU 2003 Science Education (Biology)
B.S. University of Miami 1997 Biological Sciences, minor in Chemistry

Teaching Credentials: National Board Certification 2005 in Young Adult and Adolescent Sciences; Florida Teaching Certificate, Adj. Faculty, Mathematics and Biology Faculty at Miami-Dade College
Years experience teaching: 9 years
Other Activities in School: PAC Files Coordinator

Martha Delgado, Mathematics Teacher
Current AY Teaching: 9th grade Honors Geometry, 10th grade Honors Algebra 2, 9th grade Computers, 10th grade Research, Mixed Grade Geometry class at Southridge Senior High School

Degree: B.S. FIU 2000 Mathematics Education
Teaching Credentials: National Board Certification 2006 in Young Adult and Adolescent Mathematics; Florida Teaching Certificate, Mathematics Teacher of the Year

Years experience teaching: 7 years
Other Activities in School: Project Rise Teacher; PAC Saturday School; PAC Summer Recruitment

Yanet Garcia, Mathematics Teacher
Current AY Teaching: 9th grade Geometry, 10th grade Algebra 2, 9th grade Computers, 10th grade Research, Mixed Grade Geometry class at Southridge Senior High School, Advanced Placement Statistics at Southridge Senior High School

Degrees: M.S. FIU 2001 Mathematics Education
B.S. FIU 2000 Mathematics Education

Teaching Credentials: National Board Certification 2006 in Young Adult and Adolescent Mathematics, Florida Teaching Certificate

Years experience teaching: 8 years

Other Activities in School: AP Statistics Tutor; PAC Saturday School; PAC Summer Recruitment

Melony Liz, Science Teacher
Current AY Teaching: 7th grade Honors Science, 7th grade Computers, 11th grade Honors Anatomy and Physiology, Mixed Grade Biology at Southridge Senior High School (2 sections)

Degree: B.S. FIU 2006 Science Education (Biology)

Years experience teaching: 3 years

PAC Regularly Scheduled Student Volunteers

Jose Gutierrez, Undergraduate FIU Mathematics Education student
PAC teaching assistant
Assisting: 8th grade Honors Algebra Class

Nathan Samuels, Undergraduate FIU Physics student
Assisting: 12th grade Honors Physics Class

Some Other Important Outcomes, since 1994:

BS/MAT/MS Degree Student Interns who worked, studied, and volunteered in PAC: approximately 140

National and International Presentations Related to PAC: about 50

Publications related to PAC: about 20 (see attached listing of publications)

Faculty directed Grants (NASA, NSF, Americorps, PhysTEC, others) that have helped to support the PAC Community: number=8; amount= approximately \$ 2 million

Faculty directed Grants (NASA, NSF, State of Florida DOE, DOE, others) that were funded in M/S/T Education that incorporated descriptions/research/evaluation and other links to the PAC program: number =9; amount= approximately \$ 4 million

Current Ed.D. dissertation related to PAC: (1) - Giselle Jorge, Ed.D., Dissertation Proposal, spring, 2008

Ed.D./Ph.D. dissertations completed at FIU that studied PAC students/curriculum/program: (2) -

Mario Eraso, Ph.D., 2007, Connecting Visual and Analytic Reasoning to Improve Students' Spatial Visualization Abilities: A Constructivist Approach

Rachel July, Ed.D., 2001, Dissertation Title: Thinking in Three Dimensions: Exploring Students' Geometric Thinking and Spatial Ability with Geometer's Sketchpad

MS thesis completed at FIU that studied PAC students/curriculum/program: (2) -

Jinbing Zhang, M.S., 1999, Thesis Title: Effect of Geometer's Sketchpad Instructional Environment on Ninth Grade Student Three-Dimensional Visualization

James Rodgers, M.S., 1997, Thesis Title: A Constructivist Approach to Geometry with GSP as Measured by Van Hiele: A Qualitative Study

Some specific accomplishments of some of the most recent PAC graduating senior classes:

Accomplishments for the PAC Class of 2009

- 5 students in "Top 25" of graduation class
- 4 students earned Florida Bright Futures Scholarship
- 4 students eligible for Tier 1 PAC Scholarship (4 years full tuition)
- 6 students eligible for Tier 2 PAC Scholarship (2 year full tuition)
- Whole class participation in *PAC Files* monthly newsletter
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Accomplishments for the PAC Class of 2008

- 5 students in "Top 25" of graduating class

- 5 students earned Florida Bright Futures Scholarship
- 5 students eligible for Tier 1 PAC Scholarship (4 years full tuition)... all are attending
- 6 students eligible for Tier 2 PAC Scholarship (2 year full tuition)

Accomplishments for the PAC Class of 2007

- Southridge SHS Valedictorian and Salutatorian awards
- 7 students in "Top 25" of graduating class (Summa Cum Laude)
- 7 students earned Florida Bright Futures Scholarship
- 8 students eligible for Tier 1 FIU PAC Scholarship (4 years full tuition)
- 6 students eligible for Tier 2 FIU PAC Scholarship (2 year full tuition)

Accomplishments for the PAC Class of 2006

- 9 students in Top 10% of graduating class
- 9 students earned Florida Bright Futures Scholarship
- 13 of 13 graduates eligible for Tier 1 FIU PAC Scholarships (4 years full tuition)...11 are attending
- Two out of the thirteen students are attending a technical school
- Whole class participation in Heart Awareness program



Members of the PAC Class of 2006

Accomplishments for the PAC Class of 2005

- 7 students in "Top 25" of 2005 graduates at Miami-Southridge Senior
- 10 students in Top 10% of graduating class
- 14 of 16 graduates eligible for Tier 1 FIU PAC Scholarships (4 years full tuition)...11 are attending
- 2 graduates eligible for Tier 2 FIU PAC Scholarship (2 years full tuition)
- 2 graduates are attending Duke University on full scholarships
- 1 graduate is attending Virginia Tech University
- Total scholarship funds earned over next four years are more than \$ 600,000



Members of the PAC Class of 2005

Accomplishments for the PAC Class of 2004

- 6 students in “Top 25” of 2004 graduates at Miami-Southridge Senior
- 9 of 10 graduates received Tier 1 FIU PAC Scholarships (4 years full tuition)
- 1 graduate received Tier 2 FIU PAC Scholarship (2 years full tuition following Community College)
- 2 graduates received additional FIU scholarship awards



Some teachers & members of the PAC Class of 2004

Other Worthwhile Accomplishments

The PAC teachers involve students in research-based, reform-oriented mathematics, science and technology curriculum. PAC teachers are historically highly qualified subject area specialists. Through the years, four PAC teachers have earned National Board Certification. The majority of PAC faculty has received graduate degrees in their content area field or in education. The degrees include medicine, computer science, mathematics, chemistry, science education, and mathematics education. PAC teachers are committed to professional development and life-long learning. They actively participate in science and mathematics professional development opportunities such as AP workshops and regional mathematics and physics modeling workshops. In addition, the PAC teachers have served the Miami-Dade

community as workshop developers and leaders for the Math and Science Professional Development project and New Teacher Orientation workshops.

PAC has served as a training ground for FIU student teachers (undergraduate and graduate students who are teachers-in-training) working and assisting PAC teachers, FIU faculty and PAC students, thereby gaining valuable real-world classroom experience. Through a series of grants including ones from the American Physical Society, the National Science Foundation, the National Aeronautics and Space Agency, and the Council of Great City Schools, selected FIU undergraduate education students have had the opportunity to participate in an academic and social support network for the middle and high school students in the PAC program. They work with students in classroom serving as tutors, teaching assistants, and mentors. Many are mathematics education majors, with some studying other education fields and the sciences. The PAC program allows FIU faculty and aspiring teachers to work with underserved students, increase minority teacher recruitment, and develop new education practices (especially in the areas of math, science, and technology) specifically designed for urban settings. To date, over 145 FIU students have worked as PAC assistants, completed field observation hours within PAC classes, or done research with PAC teachers and students. There have been two dissertations and two thesis projects conducted in PAC classrooms by FIU graduate students. Currently, there are four PAC-associated dissertation projects either being completed or getting started.

PAC is not only a valuable asset for the College of Education, it is an asset for the University. Over the course of fifteen years, faculty and students associated with PAC have published 24 articles, presented at national and international conferences over 50 times, and brought in approximately \$8 million in funding. There have been 7 faculty-directed grants from such agencies as NASA, NSF, Americorps, and the Florida Department of Education that helped to directly support PAC operations: These funds total \$ 2 million. Additionally, there have been 11 faculty-directed grants from such agencies as APS, NASA, NSF, the U.S. Department of Education and others that have been associated with PAC and the PAC community. In these instances, descriptions of the PAC project and its accomplishments have been successfully used as an existing infrastructure that gives grant proposals from FIU a unique edge over competing institutions. The funds granted to FIU in which PAC was not funded directly but had proposals with PAC listed as an asset total approximately \$ 6.8 million.

Currently PAC is serving as a living teaching laboratory for the Learning Assistants in the PhysTEC project housed in the Physics Department, the Noyce Foundation Scholarship Program housed in the Math Department, and the several education courses in which faculty assign pre-service teachers field experiences and observation/data collection activities with the experienced PAC teachers.

Related Publications

Jiang, Z. & McClintock, E. (2006). The effective use of technology in middle school mathematics teacher preparation. In the monograph The Middle Grades Mathematics Project. San Diego, CA: Association of Mathematics Teacher Educators.

McClintock, E. & Jiang, Z. (2006). A reality-based, technology-supported middle school teacher preparation program (A case study). In the monograph The Middle Grades Mathematics Project. San Diego, CA: Association of Mathematics Teacher Educators.

McClintock, E., O'Brien, G., & Jiang, Z. (2005, summer). Assessing teaching practices of secondary mathematics student teachers: An exploratory cross case analysis of voluntary field experiences. Teacher Education Quarterly, 32(3), 139-151

Jiang, Z. (2005). Using the dynamic geometry software to enhance students' mathematical reasoning and proof abilities. In the Proceedings of the Tenth Asian Conference on Computers in Education. Cheong-Ju, South Korea: ACTM, Inc.

Jiang, Z., & McClintock, E. (2003). Shortest path. In MainSTey Calculator and CBL-Based Activity Workbook. Baton Rouge, LA: Louisiana Alliance for Minority Participation.

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- Jiang, Z., McClintock, E., & O'Brien, G. (2003, July). A mathematical modelling course for Preservice secondary school mathematics teachers, Chapter 16. In Q. Ye, W. Blum, K. Houston, & Q. Jiang (Eds.), Mathematical Modelling in Education and Culture. Chichester, England: Horwood Publishing Limited. Proceedings from the 10th Annual International Conference of Teachers of Mathematics Association, Tokyo, Japan, 183-196.
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- Lewis, S. P., O'Brien, G. E., & Clement, G. (1999, Fall). The Everglades Digital Library. An Internet resource that can assist teacher and student efforts to study the Everglades. Florida Science Teacher, 13(1), 8-9.
- O'Brien, G. E., & Lewis, S. P. (1999). Connecting to resources on the Internet. Science and Children, 36(8), 42-45.
- Soto, P. M., Parker, J. H., & O'Brien, G. E. (1997). Our forest, their forest - A program that stimulates long-term learning and community action, in Totten, S., & Pedersen, J. E. (Eds.). Social issues and service at the middle level, Boston, MA: Allyn and Bacon, 319- 339.

All members of the FIU-MDCPS Community are welcome to visit PAC! Do not hesitate to contact Dr. O'Brien, if you want to talk about your ideas or visit with PAC. E-mail: obrieng@fiu.edu

or

For more information about other FIU Science and Mathematics Education Initiatives see the FIU PERG homepage at:

<http://perg.fiu.edu/>