High Impact Engagement of HSI STEM Undergraduates

Director – Dr. Mary Jo Parker

Program Manager – Mr. Rene Garcia

Peer Mentor Coordinator – Mitsue Nakamura

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University of Houston-Downtown

- Urban Commuter School since 1974
- Celebrating 40th Anniversary this year
  - Hispanic Serving Institution
  - Minority Serving Institution
- Tuition is 3rd most affordable in Texas
- Over 44 bachelors and master degrees
  - 14,000 Students
- ~3,000 new FTIC students annually
- ~3,500 Transfer students annually
- ~2,000 graduates each year
- Over 1100 majors in College of Sci & Tech

(Data as of Fall 2013)
College of Sciences & Technology

• Over 1100 majors in College of Science & Technology
  Composed of Departments in Natural Sciences, Computer &
  Engineering Technology, Mathematics & Statistics, and the
  Scholars Academy

  • 57% Natural Science majors
  • 36.5% Computer and Engineering Technology majors
  • 6.5% Mathematics & Statistics majors

• Scholars Academy undergraduates represent 17% of CST
  STEM majors

(Data as of Fall 2013)
Mission: To increase to 100% the number of students graduating with degrees in STEM

Vision: Through experiential support 100% matriculation into graduate programs, professional programs, and STEM industry careers
UHD has the most diverse student population of any liberal arts university in the Western U.S., according to *U. S. News & World Report.*

(SA data S13; UHD data F13)
Active learning practice research suggests increased rates of retention and student engagement result from:

- First Year Seminars & Experiences
- Common Intellectual Experiences
  - Learning Communities
  - Writing – Intensive Courses
- Collaborative Assignments & Projects
  - Undergraduate Research
  - Diversity/Global Learning
- Service Learning, Community-Based Learning
  - Internships
  - Capstone Courses & Projects

Strongest results occur only when high impact experiences are integrated systematically.

Kuh, 2008.
High Impact Educational Activities

Analyses of Selected High-Impact Activities and Deep Learning from Self-Report → High Yields

- In the early university years (freshman year)
  1) Learning Communities  2) Service Learning

- In the late university years (senior)
  1) Faculty-mentored Research

Analyses of Selected High Impact Activities and Personal Gains from Self-Report → High Yields

- In the early university years (freshman year)
  1) Service Learning

- In the late university years (senior)
  1) Service Learning  2) Senior Culminating Experience

Kuh, 2008.
UHD Scholars Academy &
High Impact Activities

• Academic Scholarships
• Academic Monitoring
  – Pre-College Start Programs
  – Free Sci/Math Tutoring
  – Mid-term Grade Reports
  – Academic Intervention
• FTIC Seminar w/PLTL
• Transfer Seminar w/PL
• Faculty/Peer Mentoring
• Research Experiences
• Broadening Career Experiences
### SA STEM Success Metrics

**SA FTIC Graduation Rate**
- 68.3%

**SA FTIC 1-Year Retention Rate**
- 67.97%

**SA Total Entering Grad/Professional School**
- 41.74%

**SA FTIC Entering Grad/Professional School**
- 44.9%

<table>
<thead>
<tr>
<th>Student Categories</th>
<th>Retention Rate</th>
<th>Graduation Rate</th>
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<tbody>
<tr>
<td>All</td>
<td>68.3</td>
<td>67.97</td>
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<td>Hisp</td>
<td>70.4</td>
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<td>AfriAmer</td>
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<td>AfriAmer Female</td>
<td>54.17</td>
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<td>White</td>
<td>61.29</td>
<td>61.29</td>
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<tr>
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<td>55.56</td>
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<tr>
<td>Asian</td>
<td>83.78</td>
<td>86.49</td>
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<tr>
<td>Asian Female</td>
<td>92.86</td>
<td>100</td>
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</table>

Value Added to UHD FTIC 6-year Graduation Rate (cohorts from 1999-2007)
- 1.74%

Disaggregate Data: Fall 2014
Longitudinal Date 99-07
Overview of SA High Impact Activities’ & Effectiveness

Acceptance into Graduate/Professional Programs

Acceptance Rates Into Graduate/Professional Schools (%)

Five year review of increases in acceptance rates into graduate and professional schools by UHD SA STEM undergraduates.
SA Efficacy & Persistence in STEM (Entrance into Graduate/Professional/Workforce)

Continuance in STEM Beyond Undergraduate Years

Persistence in STEM
(Entrance into Grad/Professional/Workforce)

Five year review of increases in continuity into graduate and professional schools by UHD SA STEM undergraduates following graduation.
High Impact Learning Communities

Fall 2011 UHD Scholars Academy Roster
Through Faculty/Peer Mentoring

Program Manager
Rene Garcia, B.S.
Admin. Assistant II
TBA

Natural Sciences (NS)

Chen
Blakley
Turner
Garcia
Fernandez
Davis
Buck
Bulent
Bennett
Baker

Computer & Mathematical Sciences (CMS)

Maths
Biosciences
Economics

Pimentel
Rivas
Winter
Rivas
Smith
McDonald

Peer Mentor
Dayna Spencer
CHE

Abisoye Adejumo Che
Joanna
Castedo
Dilan
Galicia
Dolce
Guevara
Esclat
Jimenez
Eber Quiroga
Jessica Rhone

Faculty Mentor
Dr. Aoki

Faculty Mentor
Dr. Sadana

Legend
F  New First-Time-In-Field
ASTA  Applied Statistics
Bio
BioT  Biotechnology
BPS  Biological & Physical Sciences
CHE  Chemistry
CHEM  Industrial Chemistry
CIET  Control & Instrumentation
EE  Electrical Engineering Technology
CS  Computer Science
Math  Applied Mathematics
MBio  Microbiology
SAD  Structural Analysis & Design
SFET  Safety & Fire Engineering Technology
FACULTY-PEER MENTORING WHOLE MEMBERSHIP ACTIVITIES

Orientation Meeting #1 - Fall Semester  Full Membership
  Welcome –UHD President or Provost
  Director’s Welcome
  Meet & Greet FM/PM/All members in group
  Groups assigned by discipline (eg. Bio/chem/math/CS)
  Ice-breakers
  Working lunch- SA provides
  Review and signing of SA contracts, travel forms, other
  Peer Mentors Skit
  Selected summer off-campus research presentations
  SA guidelines
  Family Picture

Orientation Meeting #2 - Spring Semester  Full Membership
  Welcome –UHD Dean & Dept Chairs
  Pot Luck lunch- FM/PM groups provide
FACULTY-PEER MENTORING GROUP ACTIVITIES

Semester Meetings Consist of 5 Home-base “Connections”

Networking Connection #1
Whole Peer Discipline Group
Ice-breaker activities;
Requirements/contract reviewed
Consensus on Service Project
Q&A with PM/FM
FM reviews development of CV/Personal Statement
FM sets appts for individual feedback on CV/PS
~2 hours in length

Networking Connection #2
Service Project activity
Post-project PM documents service project-ppt
FM/PM/Whole discipline group participate

Networking Connection #3
Individual meetings with FM for CV/PS feedback
~20-40 minutes

Networking Connection #4
Graduate School & Internship Fair (Oct)-All SA

Networking Connection #5
PM conducts individual interviews with group members
(gauge of each undergraduate’s current semester)
PEER-LED TEAM LEARNING (PLTL) AND MENTORING WITHIN SA PEER MENTORS

Peer Mentors Selection
Nominations by FM, PM, SA Admin
Frequency ranking from FM ballots
Previous good standing & nurturance
Trained in PLTL (UHD offers)
Offered position-Accepts position

Peer Mentor Retreat Training
Off-campus, recreational camp setting
2.5 days; little to no cellular access
All selected PMs must attend
SA Admin attends

Retreat Activities-Training in Creating Bonds, Trust, & Duties of PM Roles
Challenge course low elements/high elements
All meals together- Archery/Swimming (Eat-Work-Play)
Meetings- PMs “paired” with one other (PM Coordinator estab)
Pairs do everything waking thing together-must get to know each other
Meetings & “Newly wed” game –Q&A about partners & SA requirements/PM situations/PM roles
PM family picture

Semester Monthly PM Meetings with PM Coordinator & SA Admin
FACULTY MENTOR TRAINING WITHIN SA

Faculty Mentors Selection
  Director discussion with Department Chairs
  Invitation

FM Training
  On-campus
  Overview/Review of FM duties
    Secure field trip for group
    Opportunity to offer scholarly seminar for SA
    Nurture connections to UHD/SA for all in group
    Assist in retention of undergraduates
    Build relationships with future undergraduate researchers

Timelines for Reports submission
  CV/PS Individual interviews with undergraduates in group
  Feedback Interviews
  Final group analysis performance report

Two meetings per semester
Review changes in procedures
  Ex. Sign up for field trips –using BBL instead of paper
Peer-Led Team Learning, Service Learning & Mentoring Within SA Communities

Freshman START Program
- FTIC Freshman Seminar
- Scientific Research Movie Project
- Service Learning Leadership Development
- Peer Mentors - Sr. Peer Mentor

Transfer START Program
- University Seminar (Transfers)
- Scientific Research Proposal Developed
- Service Learning Leadership Development
- Peer Mentors - Sr. Peer Mentor
Service Learning: Leadership Development & Connecting to the Urban Community

- Peer Mentor group service volunteer activities
- FTIC and Transfer Seminar Course service learning
- Reflections in surveys and presentations
- Over 450 volunteer hours per semester
Service Learning –
Focus on Urban Community Needs
& Middle School-age STEM Activities

- Student Summer Programs
  - Houston PREP
  - BWET and others
- Mentoring through Examples
  - Adopt-A-Middle School
- Teacher Workshops
  - Undergraduate research students mentor
Biannual Service Survey Questions

43. List volunteer activities in which you have attended in the past year. (Name and Date)

44. Describe your participation at the volunteer event. If you attended more than one, please list the event name and your participation for each.

45. What was your attitude and perception of this activity before participating?

46. Explain how participating in these activities affected you -- personally/emotionally -- during/after the event?

47. Explain how participating in these activities affected you -- academically -- during/after the event?

48. Will you continue to participate in volunteer activities in the future? Why or why not?
Fiscal Year 2013 Survey Results

- Fall 2013 /Spring 2013 Undergraduates:

Q1: What was your attitude and perception of this activity before participating?

- Positive = 70 60
- Negative = 36 49
- Undecided = 11 13

Q2: Explain how participating in these activities affected you -- personally/emotionally -- during/after the event?

- Positive Effect = 109 106
- No Effect = 8 16
Fiscal Year 2013 Survey Results

- Fall 2013 /Spring 2013 Undergraduates:

  Q3: Explain how participating in these activities affected you -- academically -- during/after the event?
  
  Yes = 83  77
  No Effect = 33  44

  Q4: Will you continue to participate in volunteer activities in the future? Why or why not??

  Yes, I will volunteer again = 114  117
  No = 3  5
What Do They Say About Service?

- I definitely felt that this activity gave me a sense of pride about my school and the community around it. I felt that the park lacked proper care, but we were able to make it look better than what it started out to be.
- I really enjoyed it and it gave me a feeling of satisfaction and accomplishment.
- I was able to learn how to be confident when presenting in front of others.
- Respect and self esteem
- The activity brought me closer to my group members
- Personally I realized how fortunate and lucky I am to have family, food, education, shelter, etc. Interacting with the homeless people showed me that everyone is looking for the same things in life and that there will always be people who are not as fortunate and need help.
- I like how I can impact others while enjoying it as well.
- I realize that even a small amount of help can go a long way and plays an important role within the community.
- It builds on the soul and inspires me to do more.
What Do They Say About Service?

• These activities affected me by reminding me, that I shouldn't get nervous before events. It also helped me see my own strengths and weaknesses, I have now learned that personally I enjoy service learning.

• I just saw that many many people need help from students like us. The point of living in this world is not to better yourself, but to help those in need around you. To make this world a better place we must lift our poor up.

• I can't just go ill prepared into a career, I must condition myself.

• This events help to build my personality and to realize how blessed I am. It give me the courage for me to move on and hope that one day I will be able to contribute even more.

• Once I was at the school, I became really privileged that I was actually inspiring someone to go into the sciences. The students were very engaged and genuinely interested and I was able to talk to them about their future goals. It made me more grateful for the things I have as well as made me focused on making my dream a reality so that i can give back in some way in the future

• Personally these events helped me to become more grateful of the circumstances I am in, and that I am alive and well and able to help others in need as well as the community.
What Do SA Undergraduates Say About Continuing To Serve Others?

- Yes I will certainly participate in these kinds of volunteer activities in future as it always helped me gain confidence and get more experience working in a group.
- Yes, they help relieve some stress from classes.
- Yes because I want to make an difference in someone's life.
- I will continue to volunteer in the future because that will serve as a way to help others. In addition, volunteering could help improve my communication skills.
- Yes, because they help me grow more as a person, at the same time as I am helping.
- Yes, volunteering is my passion and always will be. There is always a sense of accomplishment and a content feeling you get knowing you helped in some small way, that will eventually contribute to a bigger cause.
- Yes because you never know if you are guiding a student to become the next Newtown
- Yes, volunteering is essential for the community and helps build character.
- I will because it is important that one cultivate a sense of service to individuals and/or community.
Lessons Learned:
From the SA Undergraduates Themselves

• After the event I realized that many others have bigger problems than studies, and I should do my best with these opportunities that I have.
• I have met many individuals that are very knowledgeable in certain fields that provide ideas or connections to other individuals that might be in my field of study.
• This adds more to the curriculum, because it is not just classes that we need to take in order to graduate and be successful we have to deal with many different kind of people and doing this exposes to you it, so I really liked it.
• It helped me focus on what's important in my life my education.
• I became more sure of my career choice, as one day I would like to help others through my job.
• I learned that there's more than just studying to academia - participating in community and providing positive studying environment is vital to academics.
• This activity was great because sometimes being just in schools can be a bubble. Going out and helping others gave me yet another reason to keep working hard to achieve my goals so that I can be in a position to help others and make an impact.
Undergraduate Research

• Scholars Academy membership requirement
  Apply for two research/internship opportunities per semester

• Year-round Undergraduate Research Program
  Paid research program where Academy students work with
  PhD faculty in STEM fields at UHD (about 50-60 students).

• Promotion of Off-Campus Research
  Students participate in collaborative off-campus research
  programs (~20+ placements each summer).

• Conference Travel Support
  Paid Travel for students presenting research at peer-reviewed
  scientific conferences nationwide (typically 70-80 yearly).

• UHD /SA Student Research Conference
  Campus-wide student research conference held each spring at
  UHD (about 100 posters annually).
Support of Undergraduate Research Dissemination

- 60% participation in off-campus stipend supported REUs or SURPs

- 80% participation in on-campus mentored research (with/without support)

- SURE Survey (Lopatto, 2004, 2007) indicates participation in mentored research experiences increases transition into graduate school pipelines
Scholars Academy: A Model for Supporting Student Success across STEM through High Impact Activities

- Scholarship and Stipend Support
- Establishing a Bridge
- National Recognition
- Tutors and Peer Mentors
- Undergraduate & Faculty Mentors
- Training in STEM Research
- Diversity
- Service Learning
- Culture of Academia
- Successful Entrance into Graduate and Professional Schools
- Expanding the STEM Pipeline
- STEM Graduate School Prep
- Use of STEM Seminars and Fieldtrips
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Scholars Academy: A Model for Supporting Student Success across STEM through High Impact Activities

High Impact Engagement
Leading to Student Success

- Scholarship and Stipend Support
- Tutors and Peer Mentors
- Undergraduate & Faculty Mentors
- Diversity
- National Recognition
- Training in STEM Research
- Service Learning
- Community Building
- Successful Entrance into Graduate and Professional Schools
- Expanding the STEM Pipeline
- Use of STEM Seminars and Fieldtrips
- STEM Graduate School Prep
UHD Scholars Academy

185 STEM Undergraduate members

Fall 2014
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Larry Spears, Professor in Chemistry, UHD
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Questions?

www.uhd.edu/scholars