

Final Report for Period: 03/2010 - 02/2011**Submitted on:** 05/27/2011**Principal Investigator:** Llewellyn, Donna C.**Award ID:** 0338261**Organization:** Georgia Tech Research Corp**Submitted By:**

Llewellyn, Donna - Principal Investigator

Title:

Track 2 GK-12: STEP Up!

Project Participants**Senior Personnel****Name:** Llewellyn, Donna**Worked for more than 160 Hours:** Yes**Contribution to Project:****Name:** Usselman, Marion**Worked for more than 160 Hours:** Yes**Contribution to Project:****Name:** Gaughan, Monica**Worked for more than 160 Hours:** No**Contribution to Project:**

Dr. Gaughan assisted with advising on how to integrate project activities into the social sciences. She receives 2 weeks of pay for this.

Name: Kingsley, Gordon**Worked for more than 160 Hours:** No**Contribution to Project:**

Dr. Kingsley is in charge of our program evaluation.

Name: McCoy, Tammy**Worked for more than 160 Hours:** Yes**Contribution to Project:**

STEP Program Manager--part-time.

Name: Spencer, Georgia**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Program Coordinator part-time

Post-doc**Graduate Student****Name:** George, Albert**Worked for more than 160 Hours:** Yes**Contribution to Project:**

This student is a GK-12 graduate fellow.

Name: Vaughan, Joshua**Worked for more than 160 Hours:** Yes**Contribution to Project:**

This student is a GK-12 graduate fellow.

Name: Williams, Robyn

Worked for more than 160 Hours: Yes

Contribution to Project:

This student is a GK-12 graduate fellow.

Name: Marhsall, Adrian

Worked for more than 160 Hours: Yes

Contribution to Project:

This student is a GK-12 graduate fellow.

Name: Lancaster, Kelly

Worked for more than 160 Hours: Yes

Contribution to Project:

This student is a GK-12 graduate fellow.

Name: Wayman, Brian

Worked for more than 160 Hours: Yes

Contribution to Project:

This student is a GK-12 graduate fellow.

Name: Brathwaite, Joy

Worked for more than 160 Hours: Yes

Contribution to Project:

This student is a GK-12 graduate fellow.

Name: Jones, Brad

Worked for more than 160 Hours: Yes

Contribution to Project:

This student is a GK-12 graduate fellow.

Name: Gardner, Christina

Worked for more than 160 Hours: Yes

Contribution to Project:

This student is a GK-12 graduate fellow.

Name: Clarke, Zuley

Worked for more than 160 Hours: Yes

Contribution to Project:

This student is a GK-12 graduate fellow.

Name: Collins, Austin

Worked for more than 160 Hours: Yes

Contribution to Project:

This student is a GK-12 graduate fellow.

Name: McNeeley, Katie

Worked for more than 160 Hours: Yes

Contribution to Project:

This student is a GK-12 graduate fellow.

Name: Costanza, Jed

Worked for more than 160 Hours: Yes

Contribution to Project:

This student is a GK-12 graduate fellow.

Name: Berman, Brecca

Worked for more than 160 Hours: Yes

Contribution to Project:

This student assisted with the program evaluation.

Name: Dunn, Adam

Worked for more than 160 Hours: No

Contribution to Project:

This student assisted with the program evaluation.

Name: Banaszewski, Tomasz

Worked for more than 160 Hours: Yes

Contribution to Project:

A graduate fellow working part time for us.

Name: Comeau, Benita

Worked for more than 160 Hours: Yes

Contribution to Project:

Cedar Grove High School Fellow

Name: Mukherjee, Indra Neil

Worked for more than 160 Hours: Yes

Contribution to Project:

Cedar Grove High School Fellow

Name: Moore, Daniel

Worked for more than 160 Hours: Yes

Contribution to Project:

Miller Grove High School Fellow

Name: Prince, Emily

Worked for more than 160 Hours: Yes

Contribution to Project:

Miller Grove High School Fellow

Name: Fairley, Jacqueline

Worked for more than 160 Hours: Yes

Contribution to Project:

Tri-Cities High School Fellow

Name: Doyle, Meg

Worked for more than 160 Hours: Yes

Contribution to Project:

Tri-Cities High School Fellow

Name: Amos, Benjamin

Worked for more than 160 Hours: Yes

Contribution to Project:

Westlake High School volunteer Fellow

Name: Duckworth, David

Worked for more than 160 Hours: Yes

Contribution to Project:

Westlake High School Fellow

Name: Abdur-Rahman, Luqman

Worked for more than 160 Hours: Yes

Contribution to Project:

Westlake High School Fellow

Name: Amos, Amanda
Worked for more than 160 Hours: Yes
Contribution to Project:
 Marietta High School Fellow

Name: Sorenson, Khalid
Worked for more than 160 Hours: Yes
Contribution to Project:
 Marietta High School Fellow

Name: Lettsome, Clyde
Worked for more than 160 Hours: Yes
Contribution to Project:
 Tech High School Fellow

Name: Hughes, William
Worked for more than 160 Hours: Yes
Contribution to Project:
 Tech High School Fellow

Name: Ertas, Nevbahar
Worked for more than 160 Hours: Yes
Contribution to Project:
 Evaluation graduate student

Name: Williams, Robert
Worked for more than 160 Hours: Yes
Contribution to Project:
 Tech High School Fellow

Name: Keim, Terra
Worked for more than 160 Hours: Yes
Contribution to Project:
 Cedar Grove High School Fellow

Name: Pruvenok, Robert
Worked for more than 160 Hours: Yes
Contribution to Project:
 Cedar Grove High School Fellow

Name: Vincent, Karla
Worked for more than 160 Hours: Yes
Contribution to Project:
 Cedar Grove High School Fellow

Name: McCormick, Greg
Worked for more than 160 Hours: Yes
Contribution to Project:
 Miller Grove High School Fellow

Name: Rogge, Matthew
Worked for more than 160 Hours: Yes
Contribution to Project:
 Miller Grove High School Fellow

Name: Thomas, Sara
Worked for more than 160 Hours: Yes

Contribution to Project:

Miller Grove High School Fellow

Name: Babolola, Carolyn**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Tri-Cities High School Fellow

Name: Phillips, Ronnie**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Tri-Cities High School Fellow

Name: Bryant, Jolea**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Westlake High School Fellow

Name: Christensen, Adam**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Westlake High School Fellow

Name: DeClue, Deona**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Westlake High School Fellow

Name: Jackson, Jenn**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Westlake High School Fellow

Name: Ahmed, Raga**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Marietta High School Fellow

Name: Olivera-Toro, Angel**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Marietta High School Fellow

Name: Song, Ingu**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Marietta High School Fellow

Name: Zahorian, Jaime**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Marietta High School Fellow

Name: Black, Ben**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Tech High School Fellow

Name: Theodoridis, Chris

Worked for more than 160 Hours: Yes

Contribution to Project:

Rockdale Magnet High School Fellow

Name: Wilson, Janet

Worked for more than 160 Hours: Yes

Contribution to Project:

Name: Bonhivert, Antoinette

Worked for more than 160 Hours: Yes

Contribution to Project:

Graduate Fellow at Tri-Cities High School

Name: Andrews, Samantha

Worked for more than 160 Hours: Yes

Contribution to Project:

Graduate Fellow at Tri-Cities High School

Name: Diaz, Alan

Worked for more than 160 Hours: Yes

Contribution to Project:

Graduate Fellow at Cedar Grove High School

Name: Taylor, Jennifer

Worked for more than 160 Hours: Yes

Contribution to Project:

Graduate fellow at Cedar Grove High School

Name: Johnson, Ashley

Worked for more than 160 Hours: Yes

Contribution to Project:

Graduate fellow at Westlake High School

Name: Rajaranthinam, Venmuthy

Worked for more than 160 Hours: Yes

Contribution to Project:

Graduate Fellow at Westlake High School

Name: Weaver, Jason

Worked for more than 160 Hours: Yes

Contribution to Project:

Graduate Fellow at Miller Grove High School

Name: Stout, Elizabeth

Worked for more than 160 Hours: Yes

Contribution to Project:

Graduate fellow at Miller Grove High School

Name: Damm, David

Worked for more than 160 Hours: Yes

Contribution to Project:

Graduate Fellow at Tech High

Name: Wester, Brock

Worked for more than 160 Hours: Yes

Contribution to Project:

Graduate Fellow at Marietta High School

Name: Barks, Hannah**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Graduate Fellow at Marietta High School

Name: Bartlett, Kelly**Worked for more than 160 Hours:** No**Contribution to Project:**

Graduate fellow at Tech High. Only participated in program for summer and fall, then graduated.

Name: Lambert, Kaleah**Worked for more than 160 Hours:** Yes**Contribution to Project:****Name:** Brooks, Douglas**Worked for more than 160 Hours:** Yes**Contribution to Project:****Name:** Archer, Akibi**Worked for more than 160 Hours:** Yes**Contribution to Project:****Name:** Katz, Lee**Worked for more than 160 Hours:** Yes**Contribution to Project:****Name:** Kovacs, Jennifer**Worked for more than 160 Hours:** Yes**Contribution to Project:****Name:** Whetsell, Robert**Worked for more than 160 Hours:** Yes**Contribution to Project:****Name:** Stucky, Alison**Worked for more than 160 Hours:** Yes**Contribution to Project:****Name:** Bellamy, Marcus**Worked for more than 160 Hours:** Yes**Contribution to Project:****Name:** Bernal, Ashley**Worked for more than 160 Hours:** Yes**Contribution to Project:****Name:** Baldridge, Anthony**Worked for more than 160 Hours:** Yes**Contribution to Project:**

Name: Post, Brian

Worked for more than 160 Hours: Yes

Contribution to Project:

Name: Clay, Andrea

Worked for more than 160 Hours: Yes

Contribution to Project:

Cedar Grove High School

Name: Ward, Michael

Worked for more than 160 Hours: Yes

Contribution to Project:

Cedar Grove High School

Name: landrum, Jason

Worked for more than 160 Hours: Yes

Contribution to Project:

Miller Grove High School

Name: Phan, Catherine

Worked for more than 160 Hours: Yes

Contribution to Project:

Miller Grove High School

Name: Ugenyi, Chi Chi

Worked for more than 160 Hours: Yes

Contribution to Project:

Creekside High School

Name: Wile, Brian

Worked for more than 160 Hours: Yes

Contribution to Project:

Creekside High School

Name: Harrell, Samantha

Worked for more than 160 Hours: Yes

Contribution to Project:

Tri-Cities High School

Name: Kassis, Timothy

Worked for more than 160 Hours: Yes

Contribution to Project:

Tri-cities High School

Name: Hirsch, Alison

Worked for more than 160 Hours: Yes

Contribution to Project:

Westlake High School

Name: Nunnally, Troy

Worked for more than 160 Hours: Yes

Contribution to Project:

Westlake High School

Name: Deaguero, Andria

Worked for more than 160 Hours: Yes

Contribution to Project:

Marietta High School

Name: McNair, David

Worked for more than 160 Hours: Yes

Contribution to Project:

Marietta High School

Name: Lai, Samson

Worked for more than 160 Hours: Yes

Contribution to Project:

Tech High

Name: Okerman, Jason

Worked for more than 160 Hours: Yes

Contribution to Project:

Tech High

Undergraduate Student

Name: Tuttle, Kristin

Worked for more than 160 Hours: Yes

Contribution to Project:

This student is an undergraduate fellow supported through matching funds by Georgia Tech.

Name: Musser, Andy

Worked for more than 160 Hours: Yes

Contribution to Project:

This student is an undergraduate fellow supported through matching funds by Georgia Tech.

Name: Graybeal, Katie

Worked for more than 160 Hours: Yes

Contribution to Project:

This student is an undergraduate fellow supported through matching funds by Georgia Tech.

Name: Quaife, Allan

Worked for more than 160 Hours: Yes

Contribution to Project:

This student is an undergraduate fellow supported through matching funds by Georgia Tech.

Name: Grabowski, Christine

Worked for more than 160 Hours: Yes

Contribution to Project:

This student is an undergraduate fellow supported through matching funds by Georgia Tech.

Name: Kruger, Shelly

Worked for more than 160 Hours: Yes

Contribution to Project:

This student is an undergraduate fellow supported through matching funds by Georgia Tech.

Name: Willard, Morgan

Worked for more than 160 Hours: Yes

Contribution to Project:

Cedar Grove High School undergraduate Fellow

Name: Donaldson, Karen

Worked for more than 160 Hours: Yes

Contribution to Project:

Miller Grove High School undergraduate Fellow

Name: Beck, Benjamin

Worked for more than 160 Hours: Yes

Contribution to Project:

Tri-Cities High School undergraduate Fellow

Name: Williamson, Kai

Worked for more than 160 Hours: Yes

Contribution to Project:

Westlake High School undergraduate Fellow

Name: Chang, Samuel

Worked for more than 160 Hours: Yes

Contribution to Project:

Westlake High School undergraduate Fellow

Name: Kisher, Kristie

Worked for more than 160 Hours: Yes

Contribution to Project:

Marietta High School undergraduate Fellow

Name: Dugan, Amanda

Worked for more than 160 Hours: Yes

Contribution to Project:

Rockdale Magnet High School undergraduate Fellow

Name: Wilson, Matt

Worked for more than 160 Hours: Yes

Contribution to Project:

Rockdale Magnet High School undergraduate Fellow

Name: Salome, Kathleen

Worked for more than 160 Hours: Yes

Contribution to Project:

Miller Grove High School Fellow. This student is an undergraduate fellow supported through matching funds by Georgia Tech.

Name: Silverman, Alex

Worked for more than 160 Hours: Yes

Contribution to Project:

Tri-Cities High School Fellow. This student is an undergraduate fellow supported through matching funds by Georgia Tech.

Name: Mithaiwala, Azhar

Worked for more than 160 Hours: Yes

Contribution to Project:

Westlake High School Fellow. This student is an undergraduate fellow supported through matching funds by Georgia Tech.

Name: Van Acker, Chris

Worked for more than 160 Hours: Yes

Contribution to Project:

Westlake High School Fellow. This student is an undergraduate fellow supported through matching funds by Georgia Tech.

Name: Culpepper-Hickey, Nickolas

Worked for more than 160 Hours: Yes

Contribution to Project:

Marietta High School Fellow. This student is an undergraduate fellow supported through matching funds by Georgia Tech.

Name: Rutledge, Tessa

Worked for more than 160 Hours: Yes

Contribution to Project:

Tech High School Fellow. This student is an undergraduate fellow supported through matching funds by Georgia Tech.

Name: Baskett, Kenny

Worked for more than 160 Hours: Yes

Contribution to Project:

Rockdale Magnet High School Fellow. This student is an undergraduate fellow supported through matching funds by Georgia Tech.

Name: To, Bao

Worked for more than 160 Hours: Yes

Contribution to Project:

Rockdale Magnet High School Fellow. This student is an undergraduate fellow supported through matching funds by Georgia Tech.

Name: Ekpo, Utang

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate fellow at Tri-Cities High School. This student is supported by matching funds provided by Georgia Tech.

Name: Byrd, Elisabeth

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate fellow at Cedar Grove High School. This student is supported by matching funds provided by Georgia Tech.

Name: Cohen, Shannon

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate fellow at Miller Grove High School. This student is supported by matching funds provided by Georgia Tech.

Name: Baxter, Brian

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate fellow at Tech High School. This student is supported through matching funds provided by Georgia Tech.

Name: McCoy, Mary

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate fellow at Marietta High School. This student is supported by matching funds provided by Georgia Tech.

Name: Petrie, Maria

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate fellow at Rockdale Magnet High School. This student is supported by matching funds provided by Georgia Tech.

Name: Le, Thao

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate Fellow at Rockdale Magnet High School. This student is supported by matching funds provided by Georgia Tech.

Name: Khan, Zafeer

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate Fellow at Rockdale Magnet High School. This student is supported by matching funds provided by Georgia Tech.

Name: Nweke, Chukwuma

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate fellow at Tech High. This student is supported by matching funds provided by Georgia Tech.

Name: Meeks, Michael

Worked for more than 160 Hours: Yes

Contribution to Project:

Undergraduate fellow at Westlake High School

Name: Marshall, Taneshia

Worked for more than 160 Hours: No

Contribution to Project:

Undergraduate fellow at Tri-Cities High School. Withdrew from the program during Fall semester. She was supported by matching funds provided by Georgia Tech.

Technician, Programmer

Other Participant

Name: Shook, David

Worked for more than 160 Hours: No

Contribution to Project:

Dr. Shook assisted with the summer training program.

Name: Fowler, Debra

Worked for more than 160 Hours: No

Contribution to Project:

Dr. Fowler assisted with the summer training program

Name: Lyle, Clint

Worked for more than 160 Hours: Yes

Contribution to Project:

Mr. Lyle is the administrative coordinator for this project.

Research Experience for Undergraduates

Organizational Partners

Fulton County Schools

DeKalb County School Systems

Rockdale County Schools

Marietta City Schools

Tech High Charter High School

Tech High is a charter school within Atlanta Public Schools. It operates independently of the school system, and we are therefore listing them as an independent partner.

Other Collaborators or Contacts

1. Georgia Space Grant Consortium--Conducted an aerospace workshop for 20 at-risk students from one STEP school, and classroom demonstrations for additional students at the school. Also funded field trips to Georgia Tech to see motivational speaker Dr. Calvin Mackie.
2. Georgia Tech Admissions Office?Provided speakers for STEP schools.
3. Georgia Tech Black Graduate Student Association--Assisted with recruiting STEP Fellows. Many of the Fellows were BGSA office holders.
4. Georgia Tech Institute for Bioengineering and Bioscience--Hosted STEP students at the IBB 'Buzz on Biotechnology' open house, and provided a facilities tour for students from STEP school.
5. National Society of Black Engineers (NSBE)--Georgia Tech chapter has sponsored three NSBE Jr. chapters at STEP schools. STEP Fellows brought high school students and teachers to the regional and national NSBE meetings. STEP Fellows also brought students from STEP schools to SAT prep workshops and engineering competitions given by the Georgia Tech NSBE chapter.
6. The Siemens Foundation?Awarded a grant to support teachers and teams of high school students conducting research in Georgia Tech laboratories.
7. Intel provided funds to support teachers and teams of high school students from DeKalb County schools, including two STEP schools, to conduct research in Georgia Tech laboratories.

Activities and Findings

Research and Education Activities: (See PDF version submitted by PI at the end of the report)

Please see attached file. This contains the PI Report as required by the program.

Findings: (See PDF version submitted by PI at the end of the report)

Please see attached file. This contains a summary of the evaluator's final report to the PIs.

Training and Development:

Please see activities report for this information.

Outreach Activities:

Please see findings report.

Journal Publications

Usselman, M., Kinglsey, G., Llewellyn, D., and Berman, B., "Partnerships that Spill Over", Proceedings of the 2005 American Society for Engineering Education Annual Conference & Exposition, p. on CD, vol. , (2005). Published,

Robertson M, Vaughan J, Singhose W, Pastirik M, Usselman M, & Llewellyn D, "Involving High Schools Students in a University-Level Mechanical Engineering Design Competition", Proceedings of the 2005 American Society for Engineering Education Annual Conference & Exposition, p. on CD, vol. , (2005). Published,

Gordon C, McCoy T, Reid P, Taylor K, "Reaching Back to Look Ahead", Proceedings of the 2005 American Society for Engineering Education Southeast Section Conference, p. on CD, vol. , (2005). Published,

Rosen G, Usselman M, & Llewellyn D, "Relating High School Mathematics through Sound and Images", Proceedings of the 2005 American Society for Engineering Education Southeast Section Conference, p. on CD, vol. , (2005). Published,

Llewellyn, D., Gaughan, M., Kinglsey, G., Usselman, M., "Rich Networks: Evaluating University-High Schools Partnerships Using Graph Analysis", Proceedings of the 2006 American Society for Engineering Education Annual Conference & Exposition, p. on CD, vol. , (2006). Published,

Comeau, B., Usselman, M., Llewellyn, D., & Pastirik, M., "The Consequences Of Canceling Physics: An Initial Study In An At Risk Urban High School", Proceedings of the 2006 American Society for Engineering Education Annual Conference & Exposition, p. on CD, vol. , (2006). Published,

Christensen, A.; Edwards, D.; Yoder, L.; Ho, C.; Flanagan, S.; Hurd, S.; Usselman, M.; Llewellyn, D.; Rosen, J.; Leslie, C.; Graham, S., "SERVICE LEARNING ORIENTED PRE-ENGINEERING PROGRAMS AND THEIR IMPACT ON NON-TRADITIONAL ENGINEERING STUDENTS", Proceedings of the 2008 American Society for Engineering Education Annual Conference & Exposition, p. , vol. , (2008). Accepted,

Stucky, A, Bellamy, M., Llewellyn, D., & Usselman, M., "The Consequences of Canceling Physics: Revisiting a Case Study in an At Risk Urban High School", Proceedings of the 2009 American Society for Engineering Education Southeast Section Conference, p. , vol. , (2009). Published,

Johnson, A., Edwards, D., Usselman, M., Llewellyn, D., "Engineering for High School Students", Proceedings of the 2009 American Society for Engineering Education Southeast Section Conference, p. , vol. , (2009). Published,

Johnson, A., Weaver, J., Archer, A., Post, B., Usselman, M., & Llewellyn, D., "A Comparative Analysis of Engineering Clubs in Atlanta Area High Schools", Proceedings of the 2009 American Society for Engineering Education Southeast Section Conference, p. , vol. , (2009). Published,

Bernal, A., Gravitt, A., "Promoting Engineering at an Inner-City Chartered School", Proceedings of the 2009 American Society for Engineering Education Southeast Section Conference, p. , vol. , (2009). Published,

Archer, A., Andrews, S., Babalola, K., Fairley, J., Prysock, A., Tarver, M., "Engineering Outreach by High School Students in NSBE Jr", Proceedings of the 2009 American Society for Engineering Education Southeast Section Conference, p. , vol. , (2009). Published,

Weaver, J., Ryan, M., & Usselman, M., "Using Inquiry Biomedical Engineering Cases to Increase Middle and High School Student Interest in Science and Engineering", Proceedings of the 2009 American Society for Engineering Education Southeast Section Conference, p. , vol. , (2009). Published,

Baldrige, A., Nutt, A., Vaughn, M., Hartley-Lewis, C., & Amos, A., "The STEM Club at Marietta High School", Proceedings of the 2009 American Society for Engineering Education Southeast Section Conference, p. , vol. , (2009). Published,

Llewellyn, D., Usselman, M., & Millman, R., "Designing Effective Educational Initiatives for Grant Proposals", Proceedings of the 2009 American Society for Engineering Education Annual Conference & Exposition, p. , vol. , (2009). Published,

Fairley, J., Prysock, A., Archer, A., "Using Hands-on Learning in an After-School Engineering Program to Promote STEM Careers to High-School Students", Proceedings of the 2009 American Society for Engineering Education Annual Conference & Exposition, p. , vol. , (2009). Published,

A. Wathen, W. Hunt, D. Llewellyn, P. Ludovice, M. Usselman, "A Study of Inquiry-Based Informal Science Education in an Urban High School Physics Class", Proceedings of the 2010 American Society for Engineering Education Annual Conference & Exposition, p. , vol. , (2010). Published,

Cola, J., Edwards, D., Tarver, M., Llewellyn, D., Usselman, M., "Inspiring Minorities to Enter the STEM Pipeline Through NSBE Jr.", Proceedings of the 2010 American Society for Engineering Education Annual Conference & Exposition, p. , vol. , (2010). Published,

Hunter, M., Usselman, M., Henclewood, D., Smith, M., Garrow, L., Guin, A., "BUILDING ENGINEERING ACHIEVEMENT THROUGH TRANSPORTATION (BEAT): A TRAFFIC ENGINEERING PROGRAM FOR HIGH SCHOOL STUDENTS", Proceedings of the 2010 American Society for Engineering Education Annual Conference & Exposition, p. , vol. , (2010). Published,

Llewellyn, D., Noyes, C., DeHaan, R., "PERCEPTIONS OF K-12 AND COLLEGIATE STEM TEACHING CAREERS BY COMPUTING, ENGINEERING, AND SCIENCE ADMINISTRATORS, FACULTY AND ADVISORS.", Proceedings of the 2010 American Society for Engineering Education Annual Conference & Exposition, p. , vol. , (2010). Published,

Books or Other One-time Publications

Web/Internet Site

URL(s):

<http://www.cetl.gatech.edu/step>

Description:

Other Specific Products

Contributions

Contributions within Discipline:

STEP is creating models of university-high school partnerships, extending techniques for evaluating these partnerships, and creating a university infrastructure to enable institutionalization of the program and partnerships.

Contributions to Other Disciplines:

Contributions to Human Resource Development:

During the seven years of STEP-Up, 106 graduate students and 42 undergraduate students have participated in the program.

On our last day of the funding of this project we sent out the following note to all of our fellows from the past ten years:

All: Please pause sometime today for just a second - today is the official end of our ten year STEP program. Yes, this year's fellows are still in the schools through the end of the school year. And yes, Marion and I will always find ways to use this model to continue to try to have our small impact on both the Tech community and the K-12 community. But, it is with a bit of sadness that we watch this day come and go and our official project end.

Thank you to all of you - without the fellows, this would have just been an empty project. You made it what it became and what will live on. Cheers and thanks. donna.

Here are some of the responses we received within the next 24 hours:

Thanks for all of your hard work. Because of your program I am now happily teaching and pursuing the degrees and certification necessary to one day be a teacher or school leader.

- Josh Taylor

Thank You Donna and Marion for giving us the STEP opportunity. Closing doors behind you can lead to opportunities for new ones to open in front of you!

Al-Khalique S. Hamilton

Sad indeed. Thanks to the both of you for providing such a wonderful opportunity to so many of us graduate students. Your impressions have a left marks on our lives that will last a lifetime. Love you both!

God Bless,

Douglas A. Brooks, Georgia Tech Doctoral Candidate

Hi Donna,
 I'm so happy to have been a part of the STEP program, and I'm sad to see it go. The program had a major impact on me in many ways. Thank you much for all you do.
 Best,
 Brett

let me add my pause and my thanks. there is no doubt that you and marion, through the step program, have really enriched our education. for me, you helped transform my experience at tech from a training to a more robust education. thank you, and thank you again.
 kamau

Thank you so much...you and Marion. STEP is exactly what I needed when I needed it. I can't imagine NOT having been a part of such a groundbreaking program. Thank you! Thank you! Thank you!
 Tammy

Donna/Marion,
 Sad, true indeed! I just wanted to share my appreciation for you both. I thank you so much for selecting me to be a STEP Fellow in 2009. Through STEP, I experienced growth as a teacher and established wonderful relationships with many of my students. STEP allowed me to make an impact in an area that is very dear to my heart. Thanks again for your vision and all the best as you continue your efforts in the K-12 community!
 Saunya Williams

Hello Donna,
 Thanks for the great experience! I certainly will remember the days being part of STEP and thank you for giving me that opportunity!

Just a heads up, I defended in November and graduate in the fall. I accepted a position at JPL in LA, and I just moved out here. Been a great experience thus far.
 thanks!
 -Tushar

Donna & Marion,
 I hope know the two of you know this already... but plan and simple... the STEP program was the best time I had in grad school and its all because of the two of you.

Just a real quick update from my end... while I am still a Congressional Fellow here in DC... I also started an adjunct position at George Washington University... I'm teaching undergrad physics to DC public school teachers on the weekends. The hope here is to provide them with a more advanced understanding of the subject so they can be better teachers. Let's hope so :) I tutored several teachers last semester in basic algebra and the skill level was pretty shocking. I do have a better class this time around... so now is the time to come up with some innovative activities that are fun and can illustrate physics concepts.

Just to let you know too... I will be speaking on a panel at the NSF conference in early March in support of the GK-12 program. Sorry I won't get a chance to see you this time around, but I do hope that when you are in DC next you will let me take you out to dinner!
 Thanks for everything,

Adam Christensen

Thank you so much! Being an undergraduate STEP fellow was an incredibly formative experience for me that has continued to shape my research interests and career goals.

Kristie Fisher

Donna and Marion: Just sending a big 'Thank You' for our STEP training and experiences. I'm grateful for the many fruits that have come (and will continue to come) to myself and others thanks to this initiative.

Marcus B.

Wow, 10 years! Thank you both for a wonderful experience. I learned so much about what it means to be a teacher, and really enjoyed having the opportunity to work with so many great people - you and the fellows and teachers and students!

Thanks!

Rachel Fithian

I will spare everyone from the list serve but let me also add that this program has and will continue to be a true asset to the Georgia Tech community and most importantly the graduate student body. The positive results that have come out this for both myself and hundreds if not thousands of people is impossible to sum in words.

Thank you (speaking for myself and on behalf of the entire graduate student body) to both of you for providing this opportunity.

Best,

Anthony

While I'm sad that STEP is officially ending, I'm very thankful for the opportunity to have been a STEP Fellow. I learned a lot about myself while in the classroom and I've tried to share that experience whenever possible.

Hands down, being apart of STEP is in my top 5 experiences while at Tech!!

Donna, you said 'small impact' in your note below. I would argue that you and Marion have made a very large impact. One that continues to grow as former STEP fellows and the students we taught graduate and go on to do great things.

Best,

Ashley

Hi Donna and Marion,

Really appreciated all of your hard work with this. I can definitely say that working with both of you impacted me in a really positive way.

Mark

Donna and Marion,

The training you provided during my STEP experience is valued for both the tangible (teaching methods) and intangible (importance of appreciating the reciprocity of the learning and teaching processes). Please know that although the tangible aspects of the STEP program will end today that the intangible marks you have placed within the hearts and minds of the STEP fellows, teacher coordinators, and students will forever have a continued IMPACT!

Many Many Thanks!

Jacqueline Fairley

I appreciate what you all (CETL) and STEP has done for me.

Thanks again.

Clyde Lettsome

STEP was a pivotal point in my career, and I thank you for making it a transformative and supportive program.

Please use STEP as a 'stepping stone' to continue impacting educators and students at all levels. It is up to CETL and CEISMC to train future generations.

Thank you for everything and best wishes,
Gail

It's been a pivotal experience for me. Thank you so much for selecting me and for all the work you do and have done for the program! ?
Andrea Clay

I'll add my many, many thanks to Donna and Marion as well!

This is my 9th year teaching high school, and I don't think I'd be here if it hadn't been for the STEP program.

Rex Wolf

As I sit here writing my thesis, I had to take a pause and say 'Thank you' to both of you. STEP has probably been the MOST important program that I participated in here at Tech. You helped me to realize that I do have something to offer the community in my passion for teaching. Now I can't stop teaching, I now teach yoga and I am looking for teaching positions at colleges and universities. Please continue to spread your passion to the graduate student community. You two AWESOME!!!

Peace & Blessings,
Karolyn

Donna, Marion,

I just wanted to thank you both personally for the opportunity to participate in the STEP program. It was a welcomed diversion from the typical day-to-day technical stuff most fellows usually deal with and has enriched my life and career more than any other activity here at Tech. Being a fellow provided so many opportunities to me that I would have normally never had access to and for all of this, I thank you both.

As an aside, I am heading up to Baltimore (well, Aberdeen) tomorrow for an interview at the MITRE Corporation. Along with the Aberdeen Proving Grounds located there, they appear to have a substantial STEM outreach program and my experience in STEP is certainly going to have a few of its own slides in my presentation...which I am certain will end up being interesting talking points the rest of the day as it usually seems to be.

Thanks again Donna and Marion. STEP will always have a special place in my heart...cheers!

Adam Wathen

I really appreciate the experience as well. Seeing the loosely organized chaos that is our educational system first hand has changed how I plan to interact with it both professionally and personally.
Brian Wile

Please allow me to add my THANK YOUs as well to Marion, Donna and the entire STEP Family. This is my 2nd year teaching high school mathematics and I would NOT be here in such a rewarding career if it weren't for the STEP program!
Kaleah Lambert

Thank you Donna and Marion for being pioneers and for exposing me to the treasures and challenges of teaching.
Kendra Taylor

Thanks Donna and Marion! STEP was a wonderful experience for me. It provided me with an opportunity to grapple with the challenges of making computing and engineering education practical to 9-12th graders. The pursuit of solutions to these challenges have since shaped my research and career trajectory.

Thanks,
-Christina Gardner

Thank you, thank you for what you have done through CETL and STEP! It's what convinced me to become an engineering educator, and really helped me take those first steps.

Anne-Marie Albanese Lerner

Donna and Marion,

I think I shan't send to the whole listserv, as most of the participants wouldn't know me from Adam, but I do want to share my own 'thank you.' I may not quite have ended up as a formal educator (though who knows what the future may bring!), but STEP was a turning point in my career, and I wouldn't be where I am without it or without your support.

Sorry I won't make the group toast/hug, but I'll be with you in spirit. Cheers to two people whose positive impact on my life is still being felt.

David Duckworth

Contributions to Resources for Research and Education:

The STEP program at Georgia Tech has directly led to the creation and expansion of an infrastructure that supports graduate student professional development in knowledge and skills that in the past were considered at Georgia Tech to be peripheral to the needs of a STEM research graduate student??i.e. knowledge of teaching pedagogy, direct experience in teaching and mentoring, an understanding of educational policy, and an appreciation for educational outreach and the responsibility of STEM professionals towards effecting change in the K-16 STEM educational pipeline.

The STEP training course for graduate students has been expanded and institutionalized as part of the Tech to Teaching program, funded by NSF as part of the Innovation through Institutional Integration (I3) initiative. Modules from this STEP course are included in graduate courses given by the Center for the Enhancement of Teaching and Learning (CETL) to students interested in teaching in higher education. The summer version, geared towards graduate students who will be working in the K-12 setting, provides the infrastructure to support a graduate student K-12 Teaching Fellows program, modeled after our STEP GK-12 program.

In the STEP-Up! Track 2 program we initially proposed, and were approved by NSF to implement, a GK-12 model that included in the final two years of the program a decrease in the number of hours required for the Fellowship (from 15 to 7), with a concurrent decrease in the Fellowship stipend (from \$30K to \$7K). We planned this change in order to help facilitate an institutionalization of the program, both in terms of cost in dollars and also in terms of cost in graduate student time. We have found that faculty advisors are much more willing to allow graduate students to spend seven hours pursuing the goals of the Teaching Fellows program than they were to approve of the students spending 15 hours per week doing activities considered peripheral to their research. Because of this change, we have been able to truly sustain the STEP Teaching Fellows program at Georgia Tech.

For the summer of 2012, after the completion of the official STEP program, we still have a class of nine Teaching Fellows, funded from three different sources:

Six Fellows are funded through a NSF Discovery Research K-12 program called ???Science Learning: Integrating Design, Engineering and Robotics??? (SLIDER). They participate in the summer training program, and then spend one day per week at a middle school that is piloting a robotics-based Problem Based Inquiry Learning curriculum, to assist the teachers with implementation.

Two Fellows are funded from a grant from the Goizueta Foundation to help develop an initiative to impact Hispanic K-12 STEM education in Georgia. The Fellows, both native Spanish speakers from Mexico and Puerto Rico, are taking the summer course, then will spend one day per week in a Metro-Atlanta area high school with a high Hispanic population, to work with teachers in math and science classroom and promote engagement and academic achievement among the Hispanic students.

The remaining Fellow is a "traditional" STEP Fellow who is being supported directly from a Georgia Tech faculty member's NSF research grant, as part of the broader impacts educational initiative.

This institutionalization is part of a distinct change in culture at Georgia Tech, and is a direct result of STEP. When we first proposed the STEP program in 2001, it was considered by many faculty and administrators as being the "booby prize" of graduate support. Several administrators and faculty strongly questioned the idea that any graduate student who was successful in the research realm would have any interest in this type of a program. Now, ten years later, the program is well known on campus, and is highly valued and accepted as a worthwhile experience for graduate students.

Contributions Beyond Science and Engineering:

Conference Proceedings

Categories for which nothing is reported:

Any Book

Any Product

Contributions: To Any Other Disciplines

Contributions: To Any Beyond Science and Engineering

Any Conference

Principal Investigator Report

A. Participants

1.) Senior Personnel:

Donna Llewellyn, PI, 2004 - present

Director, Center for the Enhancement of Teaching and Learning

Adjunct Associate Professor, School of Industrial and Systems Engineering

Georgia Institute of Technology

Contribution Statement:

Dr. Llewellyn oversees the whole STEP Up project. Aside from that she is in charge of the summer training and academic year seminar programs (with the co-PI), and is the troubleshooter when it comes to fellows issues. In addition, she is the point of contact for the campus issues – recruiting fellows, communicating with their advisors, getting the fellows hired, paid, and reimbursed properly, communicating with the upper administration about institutionalization efforts.

Marion Usselman, Co-PI, 2004 – present

Associate Director for Academic Outreach, Center for Education Integrating Science, Mathematics, and Computing

Georgia Institute of Technology

Contribution Statement:

Dr. Usselman takes the lead on all school system issues – interacting with the school district personnel, communicating with the school coordinators, troubleshooting with teacher issues. In addition, she is the point of contact for all QRC and NSF reporting requirements.

Samantha Andrews, Project Coordinator, 2010 – 2011

Post-doctorate Fellow

Georgia Institute of Technology

Contribution Statement:

Dr. Andrews is in charge with the day-to-day logistics issues of the project. This includes arranging for school visits, communication with the fellows, following up on project requirements, and handling our online collaboration platform.

Gordon Kingsley, Project Evaluator, 2004 – present

Associate Professor, School of Public Policy

Georgia Institute of Technology

Contribution Statement:

Dr. Kingsley is the lead on the project evaluation. He oversees graduate student assistants who carry out the focus groups, online surveys, and interviews. He is in charge of writing an annual evaluation report and with ensuring that the project is following through on its assessment plans.

2.) Graduate Students

Year 7	2010 – 2011 Academic Year					
Name	Degree	Major	Ethnicity	Gender	School	Teachers
Andrea Clay	Ph.D.	Psychology	White	Female	Cedar Grove HS	Tiffany Smith
Andria Deaguero	PhD	Chemical & Biomolecular Engineering	Hispanic	Female	Marietta HS	Amanda Amos
Samantha Harrell	MS	Building Construction	White	Female	Tri-Cities HS	Latasha Jones
Alison Hirsch	PhD	Chemical & Biomolecular Engineering	White	Female	Westlake HS	Kenyatta Stacker
Samson Lai	PhD	Materials Science and Engineering	Asian	Male	Tech High	Alan Gravitt
Jason Landrum	PhD	Biology/ International Affairs	White	Male	Miller Grove	Yvette Gilbert
Jason Okerman	MS	Electrical and Computer Engineering	White	Male	Tech High	Alan Gravitt
Timothy Kassis	PhD	Mechanical Engineering	White/Middle Eastern	Male	Tri-Cities	Latasha Jones
Catherine Phan	PhD	Aerospace Engineering	Asian	Female	Miller Grove	Yvette Gilbert
David MacNair	PhD	Mechanical Engineering	White	Male	Marietta HS	Amanda Amos
Troy Nunnally	PhD	Electrical and Computer Engineering	Black	Male	Westlake HS	Kenyatta Stacker

Chi-Chi Ugenyi	MS	Architecture	Black	Female	Creekside HS	Douglas Edwards
Michael Ward	PhD	Aerospace Engineering	White	Male	Cedar Grove HS	Tiffany Smith
Brian Wile	PhD	Biomedical Engineering	White	Male	Creekside HS	Doug Edwards

Year 6	2009-2010 Academic Year					
Name	Degree	Major	Ethnicity	Gender	School	Teachers
Christian Braneon	PhD	Civil Engineering	Black	Male	Tri-Cities HS	Mr. D'Haiti, Ms. Jones, Mrs. Tarver, Ms. Nguyen
Kevin Fairbanks	PhD	Electrical Engineering	Black	Male	Marietta HS	Mrs. Poley
	Received PhD 2010.					
Ericka Ford	PhD	Materials Science and Engineering	Black	Female	Miller Grove HS	Yvette Gilbert
David Murphy	PhD	Civil and Environmental Engineering	White	Male	Westlake HS	Sandhya Rajput
Adaora Okwo	PhD	Industrial and Systems Engineering	Black	Female	Westlake HS	Herman Fletcher and Sharia West
Alexander Raymond	MS	Electrical Engineering	White	Male	Tech HS	Mr. Bragelman and Mr. Gravitt
	Received MS					
Michael Chad Rosier	PhD	Computer Engineering	White	Male	Tech HS	Mr. Potts, Mr. Bragelman, and Ms. Costens
	Received MS and left GT. Current post: Apple Computers					
Hally Shaffer	PhD	Chemistry	White	Female	Marietta HS	Rachel Fisher
	Current post: Faculty at Berry College in Rome, GA					
Tushar Thrivikraman	PhD	Electrical Engineering	Asian	Male	Miller Grove	Mrs. Moin

					HS	
	Received PhD 2010.					
Nathaniel Tindall	PhD	Environmental Engineering	Black	Male	Cedar Grove HS	Mary Nell Higley, Tiffany Smith
Adam Wathen	PhD	Electrical Engineering	White	Male	Cedar Grove HS	Kyshia Ewing, Venkatarama Dandibhotla
Charlotte Wiest	MS	Bioinformatics	White	Female	Tri-Cities HS	Arthur Best, Andante Thomas
	Received MS 2010. Current post: Software Engineer, Janelia HHMI					
Saunya Williams	PhD	Electrical Engineering	Black	Female	Tech HS	Ms. Costen, Mrs. Abrams

Year 5	2008-2009 Academic Year					
Name	Degree	Major	Ethnicity	Gender	School	Teachers
Akibi Archer	Ph.D.	Mechanical Engineering	Black	Male	Tri-Cities HS	Marcus Harley
Anthony Baldrige	Ph.D.	Chemistry	White	Male	Marietta HS	Amanda Amos
	Received PhD 2011. About to leave for a postdoctorate fellowship at Berkeley or UCLA					
Marcus Bellamy	Ph.D.	Industrial & Systems Engineering	Black	Male	Cedar Grove HS	Kyshia Ewing
Ashley Bernal	Ph.D.	Mechanical Engineering	White	Female	Tech High	Alan Gravitt, Mary Kuthuru, Dean Potts
	About to receive PhD (2011). Will join faculty at Rose-Hulman in Fall 2011					
Douglas Brooks	Ph.D.	Electrical & Computer Engineering	Black	Male	Westlake HS	Doug Edwards, Modupe Edogan
Lee Katz	Ph.D.	Bioinformatics	White	Male	Tri-Cities HS	Gary Liu
Jennifer Kovacs	Ph.D.	Biology	White	Female	Miller Grove HS	Barbara Hampton
	Received PhD 2009. Current post: Postdoctoral Fellow, Emory University Biology Department					
Kaleah Lambert	M.S	City Planning & Civil Egn.	Black	Female	Westlake HS	Simmons, Hilton, Edogan
	Received MS 2009. Current post: High School Mathematics teacher, Creekside HS. Fulton County Schools					
Brian Post	Ph.D.	Mechanical Engineering	White	Male	Marietta HS	Latasha Lampkin
Alison Stucky	Ph.D.	Chemical &			Cedar	Tiffany Smith, Mary

		Biomolecular Engineering			Grove HS	Higley
	Received PhD 2011. Current position: Summer instructor position at Agnes Scott College					
Robert Whetsell	M.S.	Chemistry	White	Male	Miller Grove HS	Yvette Gilbert
	Received MS. Current position: High school teacher at Brandon Hall School					

Year 4	2007-8 Academic Year					
Name	Degree	Major	Ethnicity	Gender	School	Teachers
Samantha Andrews	Ph.D.	Biomedical Engineering	Black	Female	Tri-Cities H.S.	Marcus Harley
	Received PhD 2010. Current position: Post doc at Georgia Tech					
Hannah Barks	MS.	Chemistry	White	Female	Marietta H.S	Merle Jaggornauth, Amanda Amos
	Received MS 2010. Current position: Working at CDC					
Antoinette Bonhivert	Ph.D.	Chemistry	White	Female	Tri-Cities H.S.	Margaret Tarver, Turanza Jackson,
	Received PhD 2010. Current position: Senior Chemist at Dow Chemical Company					
David Damm	Ph.D.	Mechanical Engineering	White	Male	Tech High	Alan Gravitt
	Received PhD 2008. Current position: Senior Member of Technical Staff at Sandia National Labs					
Alan Diaz	M.S.	Mathematics	Hispanic	Male	Cedar Grove H.S.	Robert Hairston, Erika Bullock
Ashley Johnson	Ph.D.	Electrical Engineering	Black	Female	Westlake H.S.	Modupe Edogun, Katrina Stephens
Venmathy Rajarathinam	Ph.D.	Chemical Engineering	Asian (Indian)	Female	Westlake H.S.	Sharan Crim
	Received PhD 2010. Current position: Process TD Engineer at Intel					
Paige Stout	Ph.D.	Chemistry	White	Female	Miller Grove H.S.	Yvette Gilbert
Jennifer Taylor	Ph.D.	Chemistry	Black	Female	Cedar Grove	Ayesha Denny, Tiffany Smith

					H.S.	
	Received PhD 2011. Current position: ORISE fellow at CDC					
Jason Weaver	Ph.D.	Biomedical Engineering	White	Male	Miller Grove H.S.	Godfried Lawson, Consuela Boyd, Natasha Johnson, Solona Hollis
	Received PhD 2010: Current position: Staff Fellow at FDA					
Brock Wester	Ph.D.	Biomedical Engineering	White	Male	Marietta H.S.	Valerie Trotter
	Received PhD 2011. Current position: Senior Professional Staff at Johns Hopkins Applied Physics Lab					

Year 3	2006-7 Academic Year					
Name	Deg.	Major	Ethnicity	Gender	School	Teachers
Terra Keim	M.S.	Material Science & Engineering	White	Female	Cedar Grove H.S.	Tiffany Smith
	Received MS. Current position: Commercialization Specialist in Engineering and Physical Sciences for STC.UNM					
Robert Pruvenok	M.S.	Mathematics	White	Male	Cedar Grove H.S.	Lena Green
	Received MS. Current position: Substitute math teacher, preparing for a full-time teaching position					
Karla Vincent	Ph.D.	Biology	Black	Female	Cedar Grove H.S.	Tiffany Smith, Scott Danielson, Sakia Franklin-Jones, Robert Hairston
	Received PhD. Current position: Post-doc Fellow, University of Nebraska Medical Center					
Greg McCormick	Ph.D.	Aerospace Engineering	White	Male	Miller Grove H.S.	Solona Hollis, Yvette Gilbert, Barbara Hampton
	Received PhD. Current position: Research Engineer for the Georgia Tech Research Institute					
Matthew Rogge	Ph.D.	Mechanical Engineering	White	Male	Miller Grove H.S.	Solona Hollis, Yvette Gilbert, Nikki Stroud
Sara Thomas	Ph.D.	Environmental Engineering	White	Female	Miller Grove H.S.	Barbara Hampton, Christy Hodges
	Received PhD. Current position: Biology HS Teacher at Marietta High School					
Karolyn Babalola	Ph.D.	Electrical Engineering	Black	Female	Tri-Cities H.S.	Bertha Daughtry, Genella Spencer,

						Courtney Blackwell
Ronnie Phillips	Ph.D.	Chemistry	White	Male	Tri-Cities H.S.	Margaret Tarver
	Received PhD. Current position: Research Scientist in Corporate Research and Engineering at Kimberly Clark					
Janet Wilson	Ph.D.	Biology	Black	Female	Tri-Cities H.S.	Larrando Alexander
	Left Georgia Tech with advisor. Earned PhD in microbiology from University of Iowa in 2011.					
Jolea Bryant	M.S.	Public Policy	Black	Female	Westlake H.S.	Ajile Rahman
	Received MS. Current position: Southeast Campus Field Coordinator for National Wildlife Federation's Campus Ecology program					
Jennifer Jackson	Ph.D.	Biology	White	Female	Westlake H.S.	Ayesha Johnson
	Received PhD. Current position: Teacher at Bangor High School in Bangor, Maine					
Deona DeClue	M.S.	Economics	Black	Female	Westlake H.S.	Doug Edwards, Alison Houston
	Received MS. Current position: Client Representative for IBM					
Adam Christensen	Ph.D.	Mechanical Engineering	White	Male	Westlake H.S.	Estella Cook, Doug Edwards
	Received PhD. Current position: AAAS Science & Technology Policy Fellow—ASME Congressional Science Fellow					
Raga Ahmed	Ph.D.	Electrical Engineering	White	Female	Marietta H.S.	April Moody, Jessica Vaughan
Angel Olivera-Toro	Ph.D.	Chemical Engineering	Hispanic	Male	Marietta H.S.	Dawn Beavers, Freddy Perry, Valerie Trotter, Sandra Macauley, Bill Perry
	Received MS. Current Position: Law Student					
Ingu Song	Ph.D.	Chemical	Asian	Male	Marietta	Amanda Amos

		Engineering			H.S.	
	Received PhD 2007. Current position: Process Engineer for Texas Instruments					
Jaime Zahorian	Ph.D.	Mechanical Engineering	White	Male	Marietta H.S.	Dawn Beavers, Freddy Perry, Valerie Trotter, Sandra Macauley, Bill Perry
Ben Black	Ph.D.	Mechanical Engineering	White	Male	Tech High	Alan Gravitt, Derrick Brown, Teresa Jackson, Elisa Falco
	Received PhD. Current position: Systems Engineering - HIL, RCP and Simulation for National Instruments					
Robert Williams	Ph.D.	Material Science & Engineering	Black	Male	Tech High	William Ozawa, Alan Gravitt, Teresa Jackson
	Received PhD. Current position: Reactor Inspector for the United States Nuclear Regulatory Commission					

Year 2	2005-6 Academic Year					
Name	Deg.	Major	Ethnicity	Gender	School	Teachers
Benita Comeau	Ph.D.	Chemical Engineering	Asian	Female	Cedar Grove H.S.	Mike Pastirik, Tiffany Smith
	Received PhD. Current position: Adjunct Professor, Chemistry & Biochemistry Department at Suffolk University					
Indra Mukherjee	Ph.D.	Chemical Engineering	Asian (Indian)	Male	Cedar Grove	Barbara Heusel, Mike Pastirik
	Received PhD. Current position: Senior Development Engineer at Merk & Co.					
Khalid Sorenson	Ph.D.	Mechanical Engineering	White	Male	Marietta H.S.	Julie Pinto, Tracey Morris, Michael Moore, Dawn Beavers
	Received PhD. Current position: Control Engineer for CAMotion					
Amanda Owings Amos	Ph.D.	Chemical Engineering	White	Female	Marietta H.S.	Cheryl Cannon, Celis Hartley-Lewis, Chris Lund
	Received PhD. Current position: Chemistry teacher at Marietta High School					
Daniel Moore	Ph.D.	Material Science & Engineering	White	Male	Miller Grove H.S.	Solona Hollis, Tomeka Moody, Yvette Gilbert
	Received PhD. Current position: Research Scientist for IBM					
Emily Prince	Ph.D.	Biology	White	Female	Miller Grove H.S.	Tomeka Moody, Christy Hodges, William Garvey
	Received PhD. Current position: Postdoctoral Fellow at Friedrich Schiller University					
Clyde Lettsume	Ph.D.	Electrical Engineering	Black	Male	Tech High	Alan Gravitt, Teresa Jackson
	Received PhD. Current position: Independent engineering consultant					
William	Ph.D.	Material Science &	White	Male	Tech High	Alan Gravitt, Derrick Brown

Hughes		Engineering				
	Received PhD. Current position: Assistant Professor of Materials Science and Engineering at Boise State University					
Jacqueline Fairley	Ph.D.	Electrical Engineering	Black	Female	Tri-Cities H.S.	Lindell Coker, Margaret Tarver
	Received PhD 2009. Current position: Post-doc Fellow, Emory University					
Meg Doyle	M.S.	Chemistry	White	Female	Tri-Cities H.S.	Margaret Tarver, Larrando Alexander, Linda Dukes
	Received MS. Current position: High School ESOL Science Teacher (Chemistry and Physical Science) at Cross Keys High School in DeKalb County, GA					
David Duckworth	M.S.	Chemistry	White	Male	Westlake H.S.	Lakshmi Anumukonda
	Received MS. Current position: Development Specialist for the Millennium Challenge Corporation					
Luqman Abdur-Rahman	M.S.	Mechanical Engineering	Black	Male	Westlake H.S.	Cedric King, Richard Belcher, Doug Edwards, Estella Cook, Ajile Rahman, Kim Alston
	Received MS. Current position: Physics teacher for Teach for America in metro Atlanta					
Benjamin Amos	Ph.D.	Environmental Engineering	White	Male	Westlake H.S.	Ayesha Johnson, Kenyatta Stacker
	Received PhD. Current position: Environmental Consultant					

Year 1	2004-5 Academic Year					
Name	Deg.	Major	Ethnicity	Gender	School	Teachers
Albert George	Ph.D.	Public Policy	Black	Male	Cedar Grove H.S.	Faatimah Muhammad, Richard Alston
Joshua Vaughan	Ph.D.	Mechanical Engineering	White	Male	Cedar Grove H.S.	Mike Pastirik
	Received PhD. Current position: Post-doc Fellow, Georgia Tech					
Robyn Williams	M.S.	Chemical Engineering	Black	Female	Miller Grove H.S.	Solona Hollis, Gerolyn Woodruff, Barbara Hampton, Audrey Haywood
	Received MS. Current position: Secondary Science Teacher for James B. Dudley High School - Greensboro, North Carolina					
Adrian Marshall	M.S.	Electrical Engineering	Black	Male	Miller Grove H.S.	Solona Hollis, Gerolyn Woodruff, Barbara Hampton, Tomeka Moody, Yvette Gilbert
	Received MS. Engineer at Lockheed Martin					
Kelly Lancaster	Ph.D.	Chemistry	White	Female	Tri-Cities H.S.	Margaret Tarver, Shannon Harris
	Received PhD. Current position: Post-doc in chemistry education at the University of Colorado					
Brian Wayman	Ph.D.	Mechanical Engineering	Black	Male	Tri-Cities H.S.	Margaret Tarver, Arnold Best, Shannon Harris
	Received PhD. Current position: Senior Engineer at Becton Dickinson					
Joy Brathwaite	M.S./ Ph.D.	Economics/ Aerospace Engineering	Black	Female	Tri-Cities H.S.	Emily Zeller
Zuley	M.S.	Computer	Black	Female	Marietta	Marsha Shrago, Segana

Clarke		Science			H.S.	Ponder, Julie Simon, Tracy Morris, Brandon Andrews
	Received MS. Current position: User Experience Designer at The Economist Group					
Austin Collins	Ph.D.	Physics	White	Male	Marietta H.S.	Howard White, April Moody, Dana Meyers, Susan Morlan, Chris O'Reilly, Casey Morris
Katie McNeeley	Ph.D.	Biomedical Engineering	White	Female	Rockdale Magnet H.S.	Jill Beach
	Received PhD. Current position: Research Technician at Georgia Tech					
Jed Costanza	Ph.D.	Environmental Engineering	White	Male	Rockdale Magnet H.S.	Jill Beach, Dave Bonar
Brad Jones	Ph.D.	Industrial and Systems Engineering	Black	Male	Westlake HS	Estella Cook
	Received PhD. Current position: Postdoctoral Fellowship at the Centers for Disease Control and Prevention (CDC)					
Christina Gardner	Ph.D.	Computing	Black	Female	Westlake HS	David Hollis, Doug Edwards

Contact Info (E-Mail) for all Fellows

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3.) Organizational Partners

a. Characteristics of Schools:

All schools are urban with the exception of Marietta High School which is suburban.

Demographics:

Participating Schools (Organized by County)	Asian, Pacific Islander	Black	Hispanic	Amer. Ind. / Alaskan Native	White	Multiracial
Cobb						
Marietta High School	2%	49%	21%	0%	24%	3%
DeKalb						
Cedar Grove High School	0%	98%	1%	0%	0%	1%
Miller Grove High School	0%	98%	1%	0%	0%	1%
Fulton						
Creekside High School	1%	85%	9%	0%	2%	3%
Tri-Cities High School	2%	80%	14%	0%	2%	1%
Westlake High School	1%	97%	1%	0%	0%	1%
Charter School						
Tech High Charter School	0%	94%	0%	0%	5%	1%
Georgia	3%	37%	11%	0%	45%	3%

Source: GA Dept. of Education Data Reporting, 2009-2010 (<http://www.doe.k12.ga.us/datareporting.aspx>), 2011, May 25.

Academic standing: Georgia High School Graduation Test Pass Rates:

Participating Schools (Organized by County)	Grade 11 Math	Grade 11 Science	Grade 11 English/Language Arts
Cobb			
Marietta High School	95%	94%	94%
DeKalb			
Cedar Grove High School	85%	81%	85%
Miller Grove High School	90%	86%	87%
Fulton			
Creekside High School	86%	91%	86%
Tri-Cities High School	87%	86%	87%
Westlake High School	90%	85%	92%
Charter School			
Tech High Charter School	92%	85%	83%
Georgia	92%	90%	90%

Source: GA Dept. of Education Data Reporting, 2009-2010 (<http://www.doe.k12.ga.us/datareporting.aspx>), 2011, May 25.

*This shows the percentage of students passing the GHSGT administered in Spring 2010. The GHSGT is a standards-based test measuring how well students are mastering specific skills. Georgia students must pass all parts of the GHSGT to graduate from high school.

Academic Standing: SAT scores:

Participating Schools (Organized by County)	Math	Verbal	Writing	Total
Cobb				
Marietta High School	520	501	492	1513
DeKalb				
Cedar Grove High School	401	410	390	1201
Miller Grove High School	413	429	416	1258
Fulton				
Creekside High School	420	426	418	1264
Tri-Cities High School	425	447	437	1309
Westlake High School	440	443	431	1314
Charter School				
Tech High Charter School	398	434	407	1239
Georgia	495	492	480	1467

Source: GA Dept. of Education Data Reporting, 2009-2010 (<http://www.doe.k12.ga.us/datareporting.aspx>), 2011, May 25.

b. Activities and Fellow/Teacher team Information for last year of Fellows:

Name	School	Class	# Students	Grade
Andrea Clay	Cedar Grove HS	Biology	30 In each of 2 sections	9
		Accel. Biology	20	9
		Social Sciences	34	9-12
		AP Social Science	30	10-12
Andria Deaguero	Marietta HS	College Prep Chemistry	30 Multiple sections	10-12
		Math I	30	9
Samantha Harrell	Tri-Cities HS	Math I	30	9
		AP US History	25	11
Alison Hirsch	Westlake HS	Honors Chemistry	25	10-12
		Honors Chemistry	25	10-12
		Honors Chemistry	25	10-12
		College Prep Chemistry	30	10-12
		AP Chemistry	16	11-12

Samson Lai	Tech High	Physical Science	15-30 Multiple sections	9
		Accel. Math I	15-25 Multiple sections	9
		Math II	10	10
		Math III	15	11
Jason Landrum	Miller Grove HS	Human Anatomy and Physiology	27-32 Multiple sections	12
Jason Okerman	Tech High	Math III	21	11
		Math III	16	11
		Algebra 2	10	12
		Trigonometry	19	11-12
		Physics	22	12
		Physical Science	25	9
Timothy Kassis	Westlake HS	AP Biology	14	11-12
		STEM Academy	200	9-12
David MacNair	Marietta HS	Conceptual Physics	26-32 Multiple sections	9
		After school tutoring	Average between 10 and 30	9-12
Troy Nunnally	Westlake HS	Physics	15	11-12
		Engineering Club	15	9-12
Catherine Phan	Miller Grove HS	Physical Science	20-30 Multiple sections	9
Chi-Chi Ugenyi	Creekside HS	Math I	25-30 Multiple sections	9
		Math I Honors	15-20 Multiple sections	9

Michael Ward	Cedar Grove HS	Math 2	20	11
		Accel. Math 2	15	10
		AP Calculus	28	11-12
		Physics	12	11
Brian Wile	Creekside HS	Honors Chemistry	20	11
		AP Chemistry	11	12
		Math I	30	9
		Engineering Club	10	9-12

B. Project Summary

1.) Goals and Activities

a. Training, workshops, seminars and/or professional development for fellows and teacher

The central part of the training for the fellows is a three credit course that the fellows must enroll in during the summer before they enter the schools. For the summer 2008, this course covered the following topics:

STEP Summer Class
Introduction, Name Tag Ice Breaker, Learning Theory Introduction, Assign IRB activity
Skittles Ice Breaker, Teaching Strategies, Microteaching Introduction. (Text-- <u>Teaching Tips: Strategies, Research and Theory for College and University Teachers</u> . WJ McKeachie. Houghton Mifflin, 1999.)
Learning Styles (Text-- <u>So Each May Learn</u> . Silver, Strong and Perini. ASCD 2000)
The Equitable Classroom (David Sadker presentation--"Gender Equity in the Classroom" video), Introduction to Action Plans
Inquiry Science, Math/Science Standards, and IRB activity.
Microteaching 1--20 minute presentations of Fellow research,
Microteaching Feedback, Sexual Harrassment, Do's and Don'ts in the classroom, School partnerships
Evaluation, No Child Left Behind and AYP, School Report Card Scavenger Hunt
Microteaching 2--20 minute presentations of an Inquiry Learning Activity
Microteaching feedback, Classroom Assessment, Blooms Taxonomy
College Admissions, Advice from Prior Fellows
Special Education
Tutoring and Mentoring
Meeting with STEP Coordinators, classroom teachers
Microteaching 3--Presentation of content. Lecture or activity.
Microteaching feedback, Science Misconceptions, A Private Universe
Evaluation Focus Group session, Presentation of Action Plans

Throughout the academic year, the fellows enroll in a one credit seminar course that we use to keep in touch, to provide "just-in-time" training, and to offer an opportunity for sharing of resources, success stories and solutions to challenges.

In addition to these internal mechanisms for training, we offer several external opportunities for professional development. We always take a team of fellows to the regional GK-12 meeting, and we always take two fellows to the national meeting in DC. Further, for our engineering graduate students, we offer membership in ASEE and the opportunity to write papers and present them at the regional and national meetings. For the science students, we offer the same but for the AAAS meetings. We have taken fellows to two of the international Global Colloquia on Engineering Education sponsored by ASEE (with generous NSF supplemental funding). The fellows who have attended these international conferences have stayed involved in the organization of international

engineering students that was created at the initial meeting and are now organizers of this year's meeting for students.

For the teachers at our partner schools, we offer funding for them to attend relevant conferences and training programs throughout the year. Several usually take advantage of this to attend either science teachers or math teachers meetings and the national NSBE conference (with a team of students funded through the school). In addition, a growing number of the teachers at these schools participate in research opportunities through RET funding at Georgia Tech each summer. With support from Siemens, several of these teachers also bring a team of students to work on a summer research project that turns into an entry to the Siemens competition.

Note that our program does not have a curricular creation or design focus so that is not an expected output of our fellows.

2.) Presentations and Publications

Presentations:

Cumulative = 40

New = 8 (co-prepared and presented by PI/Co-PI, Fellow, Teacher)

Journal/Proceedings Publications:

Cumulative = 26

New = 4 (co-written by PI/Co-PI, Fellow, Teacher)

Website:

<http://www.cetl.gatech.edu/step>

This site is used for communication about the program.

**NSF STEM Program Summative Report
Part II: External Evaluator's Report**

Evaluating 2001 to 2010

**The Student Teacher and Enhancement Partnership
at the
Georgia Institute of Technology**

**A Project Sponsored by the
National Science Foundation GK-12 Program**

Report Prepared by

Misty Guard and Gordon Kingsley

Assistance provided by Sean Dunn and Alex Mann

School of Public Policy
Georgia Institute of Technology

May 2011

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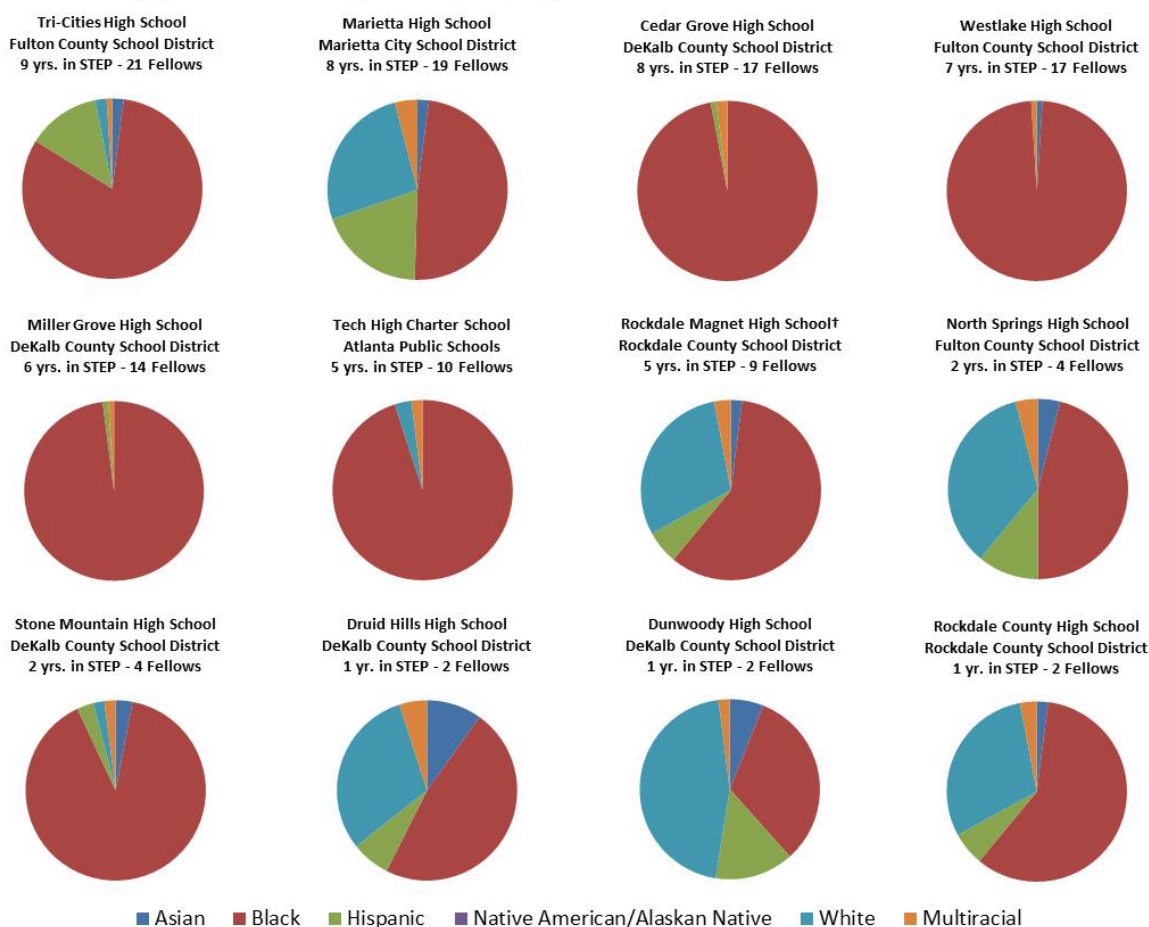
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1) PROJECT GOALS AND METHODS

The Georgia Institute of Technology (Georgia Tech) STEP Up! project created long-term partnerships between Georgia Tech and under-served high schools in the Atlanta metropolitan area. STEP Up built upon and expanded partnerships first established under the Student and Teacher Enhancement Partnership (STEP) project. The STEP Up project institutionalized teaching internships as a valued component of graduate education at Georgia Tech. STEP Up also contributed significantly to the creation of a climate at Georgia Tech that encourages the active participation by university students and STEM (Science, Technology, Engineering, and Mathematics) faculty in the challenges of K-12 education.

The data presented in this final evaluation report provides trends that began in the STEP and continued under STEP Up. This trend data is referred to the STEP program throughout this report. The STEP program partnered university graduate students (referred to as Fellows) with metro-Atlanta area high school STEM teachers to enhance the STEM education in the high schools and the educational experiences of the Fellows. The evaluation observed the placement of 121 Fellows in 12 high schools distributed across five school districts. Dashboard 1 below provides the demographic student composition, school district, years in the STEP program, and the number of Fellows for each high school. Fellows had direct and indirect interactions with approximately 175 teacher and school coordinators over the duration of the programs.

Dashboard 1. Demographic information for high schools participating in STEP



Source: GA Dept. of Education Data Reporting 2007-2008 (<http://www.doe.k12.ga.us/ReportingFW.aspx>), accessed 2010 October 8

†Demographic information was not available for Rockdale Magnet High School. However, Rockdale Magnet operates as a sub-school within Rockdale County High School; therefore, the demographic information for Rockdale County High School was utilized for Rockdale Magnet.

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The Student Teacher and Enhancement Partnership
Georgia Institute of Technology**

The STEP program was funded through the National Science Foundation's (NSF) GK-12 grant program. STEP Up was funded through a five-year program extension sponsored through the GK-12 Track 2 program. STEP operated from August 2001 through May 2004 and STEP Up operated from June 2004 through February 2011. This report is a summative assessment of both programs that covers the time period up to May 2010. The overall number of participants in the STEP program is higher as the evaluation does not include the class from the most recent year. Our evaluation strategy is designed to target two key questions:

- Did the STEP programs enhance math and science partnerships between Georgia Tech and the high schools by introducing Fellows as a resource for teachers?
- What are the impacts of participation in the STEP programs on Fellows, teachers, high schools, and university faculty?

Evaluation Methods

This evaluation is a multi-year, multi-method analysis to observe trends in the STEP program through the development of aggregate narratives for each group of participants (Fellows, Teachers, and Advisors). The narratives provide within and across group perspectives regarding the STEP programs. We used a variety of data sources to prepare these narratives:

- Fellow journals: STEP Fellows journal their experiences, insights, and observations. The journals maintained by STEP Fellows for every year of the STEP program. These journals have been analyzed using a qualitative coding theme.
- Online surveys: Beginning with the STEP Up program, online surveys were utilized to incorporate a longitudinal component into the program evaluation. Web surveys have been tailored for the following groups: Fellows; Teachers; Advisors; and Fellow Alumni.
- Fellow focus groups: We conducted two focus groups with the Fellows annually. The first meeting is scheduled at the conclusion of the summer training, and the second meeting occurred at the end of the GA Tech spring semester. Additionally, we conducted two Alumni focus group sessions with some of the Fellows in May 2010.
- Interviews: We conducted two semi-structured interviews with the Principal Investigators and semi-structured interviews with some school coordinators.

For an item to be included as a finding in this study there had to be agreement across the evidence from at least two of these data sources.

2) EVALUATION FINDINGS

The Fellows Experience

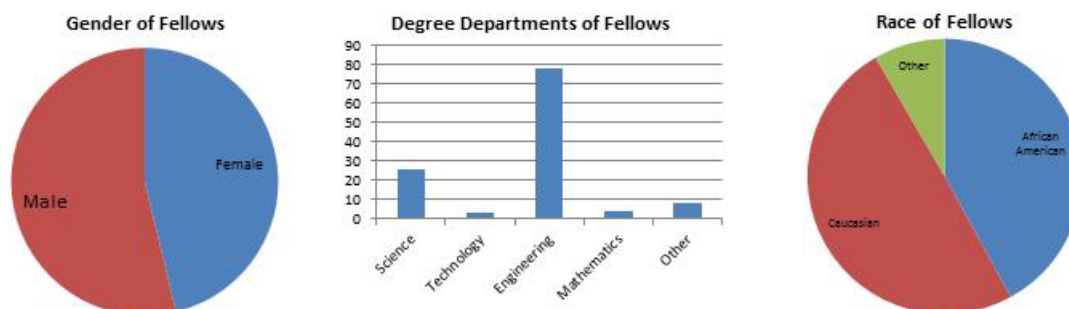
The STEP project and the STEP Up project differed in the expectations associated with the amount of time students devoted to the Fellowship and the level of financial support offered to the Fellows. The Fellows in the STEP project were offered significant stipends that supported 10 hours in the classroom each week and time for other forms of student engagement. STEP Up was particularly tailored towards institutionalizing the concept of Fellowships within the Georgia Tech campus. Consequently the stipends were reduced; the number of hours spent in the school reduced from 10 to 5 hours; and Georgia Tech schools and laboratories were encouraged to give greater support to Fellow participation in STEP UP. This strategy seems to have worked. In surveys of faculty advisors there was willingness to support STEP fellows after the program ended (4.5 on a 5 point scale amongst 2009-2010 advisors). While this did not translate into a willingness to devote significant research dollars to support STEP Fellows there was a willingness to see Institute and School dollars be devoted to the enterprise and there was recognition that the STEP program was a useful way to serve funding requirements for research outreach and broader impacts.

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One consequence of the scale back in support and time in the classroom is that some of the trend data for Fellow activities diminishes over time. This is not interpreted as reduced impacts from the STEP program. Rather this trend is a natural outgrowth of planned resource constraints as the emphasis shifted towards institutionalization.

Of the observed Fellows 50% were Caucasians, 42% African-Americans, and 8% other. The gender distribution of the observed Fellows was 54% male and 46% female. The disciplinary distribution of students reflects the nature of programs offered at Georgia Tech with 66% of the observed Fellows studying for advanced degrees in engineering fields, 22% studying in natural science fields, and 12% studying in other fields such as the social sciences or a technology specific field of inquiry. Dashboard 2 provides a visual representation of these distributions.

Dashboard 2: Fellow Demographics



Typically a STEP Up Fellow would serve in a role that emphasized lesson preparation, lab preparation, class presentations, and student mentoring. In the classroom, Fellows predominantly were engaged in teaching and assisting in science-based classes; however, after-school activities predominantly revolved around engineering in forms such as robotics clubs or National Society of Black Engineers Jr. Clubs. The frequency of Fellow engagement with after school clubs and programs diminished over the years. This coincided with the decrease in Fellow time commitments to the schools.

Fellows consistently reported having a positive impact on student development in both class and activities over the years of the evaluation. Fellows also consistently reported over the years that in the classroom high school students were not particularly motivated by the subject matter, nor did they perceive science and mathematics as a possible career path. This contrasted with Fellow engagement in school activities where self-selection by high school students in clubs and after school mentoring programs led to higher Fellow perceptions high school students to have a stronger interest in STEM related fields. The Fellows, also, consistently reported having a positive impact on high school teacher content development through their engagement in the classroom and activities. However, high school teachers reported less of a benefit to the students and content development from Fellows as STEP UP progressed largely due to the reduced time of Fellows in the classroom.

There was wide agreement across data sources (journal analysis, surveys, and focus groups) on the characteristics of a successful engagement between Fellow and teacher. One of the co-PI's for the project summarized the characteristics of Fellows who were more likely to connect with teachers: Fellows who were passionate, adaptable, and strong communicators and exhibited "a willingness to go into different cultures, observe, learn, and make an impact. Fellows, also, needed to know how to take initiative without stepping on the toes of teachers and administrators or trying to change everything about STEM education.

Part of the challenge many Fellows experienced during the program was balancing STEP activities with their research and academics. Fellows reported spending more time on lab research at Georgia Tech than either STEP-related activities or coursework-related activities. While the hours required for STEP

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were reduced from 10 hours to only 5 hours in the same year the stipend was decreased, yet across all years, Fellows report spending the same average amount of time on STEP. Some advisors noted a reduction in the amount of time the student spent each week on research during Fellow's participation in the STEP-program. Over the years of the STEP program advisors were consistent in allowing their students an average of 10 hours per week away from the lab for STEP-related activities. Regarding their academic plans, over 80% of Fellows responded that STEP did not delay their academic plans, nor would they have been better served in their academic pursuits had they not participated in STEP.

During the focus groups, Alumni Fellows noted that the stipend awarded by STEP contributed significantly to their decision to participate. This was particularly apparent among Alumni who participated in earlier years, before the stipend was decreased by more than 2/3. The two most common reasons given by Alumni included lack of funding from their labs, as well as the time commitment. In contrast, when asked to identify their Fellow's incentive for participating in the program, faculty advisors felt that the opportunity to give back to the community was a larger factor than the stipend.

High school teachers consistently reported a high level of support from school administration for the STEP program, as well as a desire to work with STEP Fellows through the years. Teachers felt that Fellows were open to their input and were able to communicate with them at school. Teachers indicated that Fellows also participated, though less often, in helping with science research projects, organizing field trips and after school clubs, developing websites, grading, and other student assessments. Teachers believed that Fellows exhibited successful pedagogy and a strong command of the subjects taught, and that Fellows interacted positively with students. African American teachers overall agreed more strongly with positive statements about Fellows than teachers of other races. In the later years of the program when the STEP Up project changed the stipends and time requirements the teachers reported spending less time with the Fellows in the classroom and activities.

High school teachers' average number of years of teaching experience remained relatively stable, approximately 10.5 years, over the years; however, the level of education of the teachers increased from bachelor's degrees to graduate-level degrees including master's, specialist, Ed.D, ABD, and Ph.D. Teachers predominantly hold science-based Georgia Educator Certifications, which have increased from largely Level 4 certifications to Level 5 certifications. Teachers report a decrease in support and monetary resources for math and science programs by school administrations throughout all the school districts involved in STEP. Additionally, teachers report the high schools have decreased support to the top 25% of the student body, while simultaneously increasing support for the bottom 50% of the student body. Consistently over the years teachers' reported that their morale associated with working in the schools had decreased. However, this change in morale was associated with the changing work environment. In contrast, the STEP program was a bright spot in the work lives of teachers.

The Georgia Tech Faculty Advisors participating in the STEP program often thought highly of their student's academic and research abilities, with oral presentation skills and leadership skills topping the list of traits and ranking around top 10% in class; however, overall, the Fellows do not rank in the top 10% of their class nor were they the strongest researchers in the lab. Other skills, such as research design, laboratory skills, technical expertise, and writing skills were ranked notably lower, averaging top 25% in class but varying greatly among the labs. When asked about recommending the STEP program to other Fellows, faculty advisors responded overwhelmingly that STEP is more appropriate for students with an interest in teaching than for students with an interest in research.

The Fellow's labs were diverse but over the years of the STEP program exhibited little variance among key demographic measurements, including an average of 15 people working in their lab centers or programs, with 65% of the students in the lab being from the United States and 31% of the students being female. PhD students in these labs are reported by their advisors as working an average of 40 hours per week with a 12-month stipend averaging \$21,691.

Although many advisors only learned of the STEP program when their student asked to participate, most reported that they strongly encouraged their student to participate in the Fellowship. Many faculty

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advisors reported that Fellows made significant contributions to research outputs prior to participating in STEP as well as during their Fellowship. Most Fellows also believe that while participating in STEP, their advisors were satisfied with their progress, and almost all advisors will continue to support their student with a GRA following their participation in STEP.

Partnership

One of the primary goals of STEP was to build partnerships between area high schools and Georgia Tech. Over the life of the STEP program the Georgia Tech principal investigators exhibited a preference for partnering with schools that served under-represented populations in science and engineering disciplines as well as schools with few historic ties to Georgia Tech.

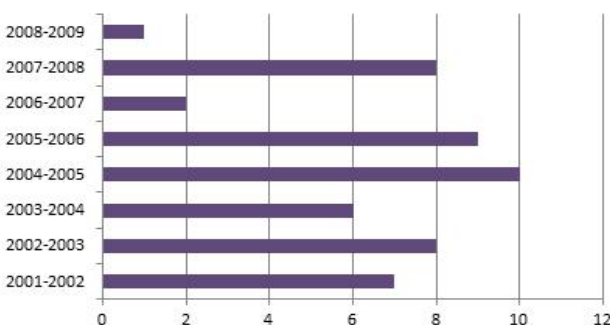
Partnership development occurred both formally and informally. Formal partnering was established through working agreements between the Georgia Tech co-PI's and the high school staff. These relationships were monitored closely by one of the co-PI's. Informal partnering was observed through Fellow engagements with teachers and students going beyond the classroom and drawing upon other resources available through Georgia Tech. One of the interesting indicators of success of the partnership was observed through spillover relationships when high school teachers and coordinators began to interact with Georgia Tech in ways beyond their interactions with Fellows.

Fellows, teachers, and advisors reported the use of Georgia Tech resources. Fellows, teachers, and advisors reported using materials from Georgia Tech labs for teaching purposes. The Fellows organized tours of laboratories, facilities, and the campus; attended presentations at Georgia Tech with high school students; and assisted with high school student experiments at Georgia Tech laboratories. The incidence of Fellow resource engagement declined over the years as the amount of Fellow interactions outside of the classroom decreased. As one fellow stated: "The GT visit went well. Most of the kids seemed to enjoy it and the seniors were happy about the information they got from the Admissions and Financial Aid representatives. Partnering related activity was not evenly distributed across the Fellows nor across the years of the STEP program. For example, Fellows at Tri-Cities High School reported a greater number of class and after school activities aimed at partnering over the years of the program. Similarly male Fellows reported a higher percentage of partnership-oriented activities.

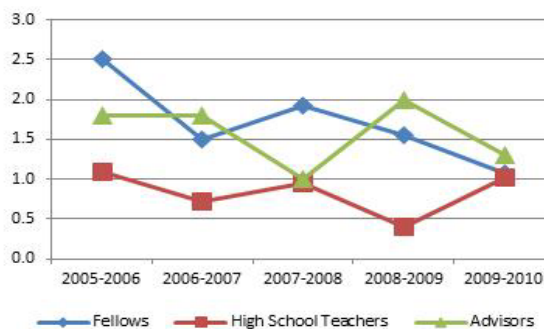
Reported on partnering activities also tended to decrease over the years as Fellow time became more concentrated in the classroom. Dashboard 3, below, offers illustrations of these trends.

Dashboard 3: Partnership activities decline

Journal Entries coded for Partnership



Use of GA Tech Resources over the Years



High school teachers also noted the trend towards decreasing Fellow engagement in partnering related activities. This was particularly pronounced amongst Caucasian high school teachers. Also, high school teachers did not report regularly seeking to involve students in activities at Georgia Tech. Over the years of the STEP program partnering tended to be more associated with school activities and clubs rather than an extension of the classroom experience. Additionally, high school teachers did not report participating regularly in workshops offered at Georgia Tech, with the exception of Miller Grove and Westlake High Schools. High school teachers reported they communicated with Georgia Tech staff, faculty advisors,

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and other personnel less than once a year; however, they communicated with Fellows about once a week. However, the data suggest that teachers did not include the co-PIs from the STEP Up project in their assessment of contacts with Georgia Tech staff. High school teachers across all high schools agreed they were better off because of the STEP partnership with GA Tech, with male high school teachers strongly agreeing.

In the early years of the STEP program, high school teachers, particularly women, report increasing their interactions with Georgia Tech particularly through the Georgia Intern Fellowships for Teachers program (GIFT) – a professional development program for teachers in math and science disciplines organized and conducted by Center for Education Integrating Science, Mathematics, and Computing (CEISM). However, high school teachers reported interacting less with Georgia Tech through GIFT and course offerings as the years progressed.

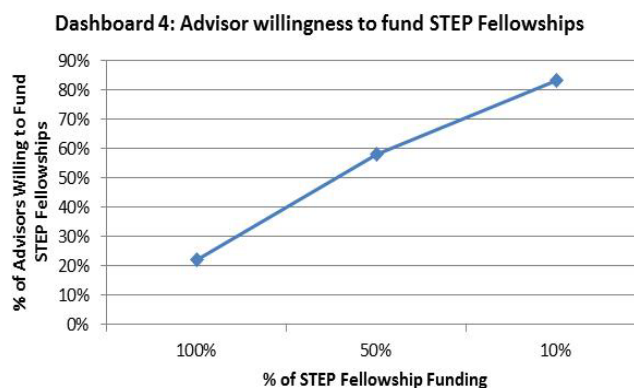
Faculty advisors of Fellows indicated an increase in interactions between Georgia Tech laboratories and high schools due to STEP, whereas they reported no contacts with high schools prior to the STEP program. Faculty advisors reported communicating with Georgia Tech staff, faculty advisors, and other personnel less than once a year; however, they communicated with Fellows about once a week. Faculty advisors reported interacting with Tri-Cities, Marietta, and Westlake High Schools the most; however, the interactions usually occurred no more than once a year and never exceed a monthly interaction. However, advisors report that Fellow participation in the STEP program has not increased the likelihood that they will engage with high schools in the future.

A lasting impact of the STEP program has occurred through the former Fellows. Over 50% of Fellows report engaging in partnerships between high schools/universities and workplaces, ranging from “keeping in touch” to running workshops, giving presentations, and recruiting. Fellows are less likely to engage in partnership activities in their personal life. Some fellows, however, still volunteer and even mentor at their originally assigned STEP school, particularly if they helped form afterschool organizations or mentoring programs. Also, Fellows with children noted that are more likely to volunteer at their child's school.

Institutionalization

For the STEP program to be considered fully institutionalized, the core components of the program must be incorporated into Georgia Tech and/or the high schools and continue functioning after the grant ends. Such scenario is unlikely to happen. However, the STEP program has laid the foundation for institutionalization of similar programs in two important ways. First, it has offered a proof-of-concept to the faculty and administration of Georgia Tech that this type of engagement has value to the education of students and can contribute to the larger research mission of the institution by giving an effective path for achieving broader impacts and engaging under-served communities. Second, it has established relationships with under-served high schools, many of which had no history of interaction with Georgia Tech. As the STEP program winds down the travelers on the paths of partnership that were blazed will seek new ways of keeping productive relationships open.

To make the goal of institutionalization more attainable, STEP lowered the stipend given to Fellows as well as the hours per week required (from 10 to 5) in order to make the program more sustainable, and only focused on schools committed to making a lasting partnership with STEP. The P.I.'s made it a point to put more effort into the schools with active/ supportive teachers, and pull out of schools with no teacher buy-in. One notable accomplishment was navigating the tuition and stipend compromise between STEP funds and the various labs pay structures which allowed Fellows to have their tuition



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paid by STEP and the stipend paid by their lab.

Dr. Llewellyn describes institutionalization as “very culture specific,” and explains that between the changing regulatory environment of STEP and the lack of a model in place for Georgia Tech to become the primary funding mechanism, there are barriers to institutionalization. Also, Georgia Tech advisors were sometimes reluctant to have their graduate students committed to work outside of the lab, however only 3 advisors out of over 100 surveyed demonstrated reluctance to not allow their student to participate in the program, and surveys show that time conflicts aside, advisors were supportive of the program overall.

The initial grant did not have an institutionalization component. The institutionalization of the partnerships created between Georgia Tech and the high schools, an important goal in the early years of the program, is not strongly supported by the data. Though relationships were created by the STEP program, there is not a strong likelihood that they will be lasting once the fellows are no longer planted in the high schools.

Conclusion

The STEP program has been a challenging, rewarding experience for Fellows, high school teachers/administrators, faculty advisors, and Georgia Tech staff. STEP was successful in skill development of Fellows through enhancement of time management skills, teaching skills, communication skills, and self-discipline leading to development as better students overall. Additionally, the benefits to Fellows was reported by faculty advisors as a noticeable ability to present complex material as well as increased enthusiasm in their field of inquiry. Most notably, advisors strongly agreed that STEP contributed to Fellows' development as teachers, which was echoed by high school teachers/coordinators who overall strongly agreed that Fellows improved as teachers over the course of the year. Overall, Fellows agree that STEP is a challenging, but rewarding experience, and on the whole the fellowships were successful.

The structure of the STEP programs pertaining to Fellows development and support was resoundingly effective for the Fellows participating in the programs. Overall, the Fellows report the summer training and Principal Investigators (PIs) support as beneficial and sufficient for facilitating a successful STEP fellowship. Many of the STEP Fellows report feeling as though belonging to a “STEP family” created by the Principal Investigators, which ceases to exist upon completion of their participation. Alumni of the STEP programs express a desire to continue the “STEP family” through social interactions extending beyond the confines of the STEP programs. Many alumni expressed an interest in the development of a site facilitating “social interactions” amongst current Fellows and alumni.

The lasting impressions of STEP Fellowships on the Fellows are dynamic. Most alumni stated participation in STEP influenced their career goals. Although the STEP program did not increase Fellows desire to teach at the high school level overall, it did increase a desire to teach at the college level and reportedly make them more effective at doing their jobs. Furthermore, Fellows noted that STEP has made them more aware of the importance of volunteering and even made them more attracted to organizations that rely upon volunteers.

STEP adapted over the years to facilitate partnership development between Georgia Tech and high schools. Often grants-based partnership development results in the knowledge of the possibility for partnership development with those involved in the program. The STEP programs increased the frequency and significance of the programmatic interactions between Georgia Tech and the high schools with Fellows playing the key role in stimulating increases in interactions. However, the analysis indicates the formal programmatic partnership between Georgia Tech and the high schools will end upon the completion of the STEP program. The lack of engagement and interaction between Georgia Tech personnel, high school teachers/coordinators, and faculty advisors indicates removal of the Fellows, the informal mechanism, from the high schools will effectively remove the impetus for interactions. However, the STEP program has resulted in the development of enabling informal partnerships amongst high school teachers/coordinators, high school students, and Fellows, which is evidenced to exist beyond the STEP program.

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The ability to develop formal programmatic partnerships would require targeted development and establishment strategies aimed at the high schools and Georgia Tech. To facilitate lasting formal programmatic partnership development, the PIs would need to focus and facilitate more engagement within Georgia Tech at the school and department levels. Furthermore, facilitation of communication between the high school teachers/coordinators and the Georgia Tech schools/departments could lead to strong partnership development.

Institutionalization of STEP would likely require a push from Georgia Tech for the integration of STEP as a university-directed goal. It is unlikely whether this could be accomplished solely by the PIs, without extensive support from schools and departments throughout the Georgia Tech.

Perhaps the best endorsement of the STEP program is the resounding belief of high school teachers across all high schools agreeing they were better off because of the STEP partnership with Georgia Tech. Furthermore, faculty advisors resoundingly agreed they would like to see Georgia Tech continue the program beyond the NSF grant and the faculty advisors would be willing to fund 10% of GRA stipends to support the continuation of the STEP program. Additionally, faculty advisors would be willing to devote laboratory research resources and encourage GA Tech Schools to devote resources for the continuation of STEP.