

# **Voices of Successful Women Community College Students in Science, Technology, Engineering and Math Fields**

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American Educational Research Association  
Annual Conference 2014

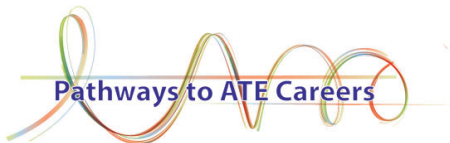


This material is based upon work supported by the National Science Foundation under Grant No. DUE 1003589. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.



# Introduction

- Number of available STEM jobs is increasing rapidly (Bayer Corporation, 2012; Robelen, 2012)
- Of the best 25 jobs, 60% are in STEM fields (US News Staff, 2012)
- Offer job security, stability, and upward mobility (Bayer Corporation, 2012; Darling-Hammond, 2010; Garibay, 2012)
- Many STEM-related careers require a sub-bac degree earned in 6 months to 2 yrs at a community college (Costello, 2012; Grandgenett, Ostler, Jeanetta, & Surface, 2010; President's Council of Advisors on Science and Technology, 2012)
- Women are not equal beneficiaries of these advantages; there has been a 25% decline in the # of women earning STEM-sub-bac degrees at CCs (Bayer Corporation, 2012; Costello, 2012; President's Council of Advisors on Science and Technology, 2012)
- A STEM student's persistence results from a "complex interplay of factors" (Maltese and Tai, 2011 p. 901)



"STEM"= Science, Technology, Engineering, Math  
"CCs" = community colleges



# Setting

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- Advanced Technological Education (ATE)
- National Science Foundation sponsored initiative
- Specifically values underrepresented students
- In 100+ U.S. community colleges (Patton, 2008; Westine, Gullickson, & Wingate, 2010).
- Goal is to improve STEM education for technicians in advanced technology industries
- 27% of ATE graduates are women (Westine et al., 2010)

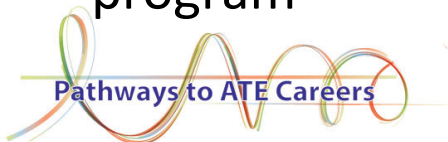


# Methods

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RQ: How do successful women students in Advanced Technical Education (ATE) programs in community colleges describe barriers and supports to their success?

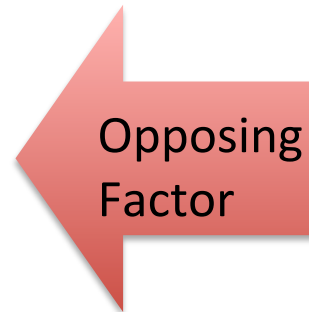
- Grounded in social cognitive career theory (SCCT) (Lent et al., 2005, 2008; Silverman, 2009)
- Semi-structured, multi-interview qualitative research design to understand the meaning women ascribe to their success (Bogdan & Biklen, 2006; Creswell, 2009; Lent et al., 2010; Silverman, 2009)
- Small # of successful women graduates through a semi-structured, multi-interview research design (Moustakas, 1994)
- Success was defined as having completed 2 semesters of the ATE program



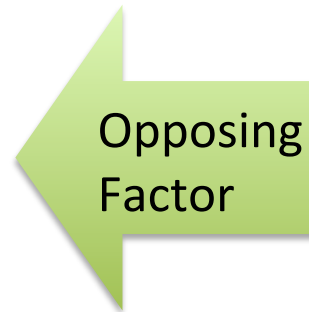
# Three Factors Emerged

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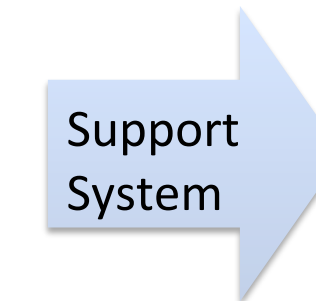
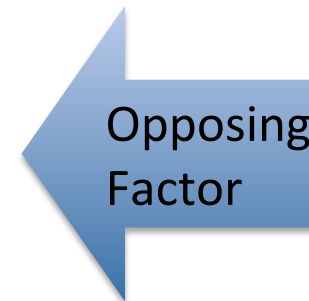
1. Self Efficacy



2. Science Identity



3. Social Support  
System



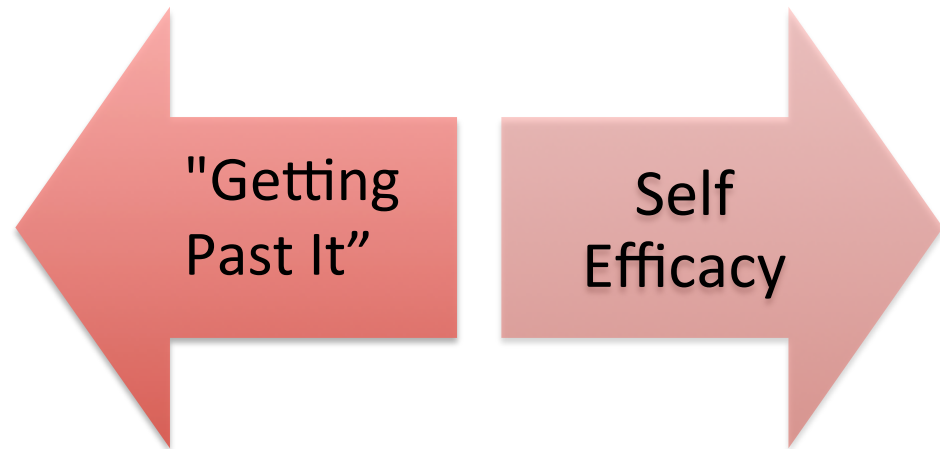
# Self Efficacy

Developed through...

- “Mastery experiences” (Bandura, 1997)
- Seeing women succeed in STEM fields
- Encouragement from professors
- Peer support/workgroups

“Getting past it”

- Negative experiences, stereotypes



*“I feel like in order to become a scientist you had to be super smart... You know in the science field, I was like, well okay maybe I’m not smart enough to do it, and then once I got past it...” -Student*

# Science identity

Developed through...

- Time in research laboratories
- Doing authentic science research
- “Vida Real, ” Real life
- Project based learning



Identity  
Conflict

Science  
Identity

Identity conflict...

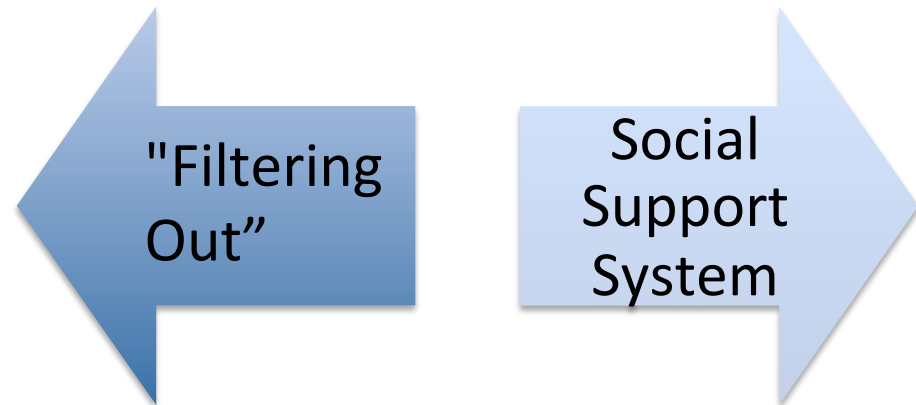
- “Weeding out” unqualified students
- Impersonal interactions
- Lack of relevance

*“It’s like what we are doing in lab and class are related to ‘vida real’” -Student*

# Social support network

Developed through...

- Support from their professors
- Cohorts
- Built-in, required tutoring sessions with peers



“Filtering out...”

- *“He filters them out and makes them feel stupid in front of the class” – Student*
- Peer intimidation

*“I really feel like these people [ATE instructors, staff] are trying to help me succeed...” -Student*



# Implications

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- If some women succeed in STEM education, how can we better support all women through STEM education?
- Promising practices to facilitate women's success in STEM
  - Cohorts & tutoring sessions
  - Women scientists in action
  - Authentic science experiences
  - Opportunities to communicate science
- Evaluate ATE programs' demographics and current practices to support women
- Further studies in postsecondary settings will be important to supplement

(Costello 2012; Hill, Corbett, and St. Rose 2010; Osborne, Miller, Farabee-Siers 2008). Maria Ong and colleagues (2011) (Solorzano et al., 2000). (Calabrese Barton et al., 2013; Collins, 2000, p. 17)(Carlone & Johnson, 2007; Grossman & Porche, 2013; Rosenthal, Levy, London, Lobel, & Bazile, 2013



# Thank you

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