

## Experiences of Female STEM Transfer Students

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**Creating Pathways for STEM Transfer Student Success**  
Asheville, North Carolina  
September 13, 2011

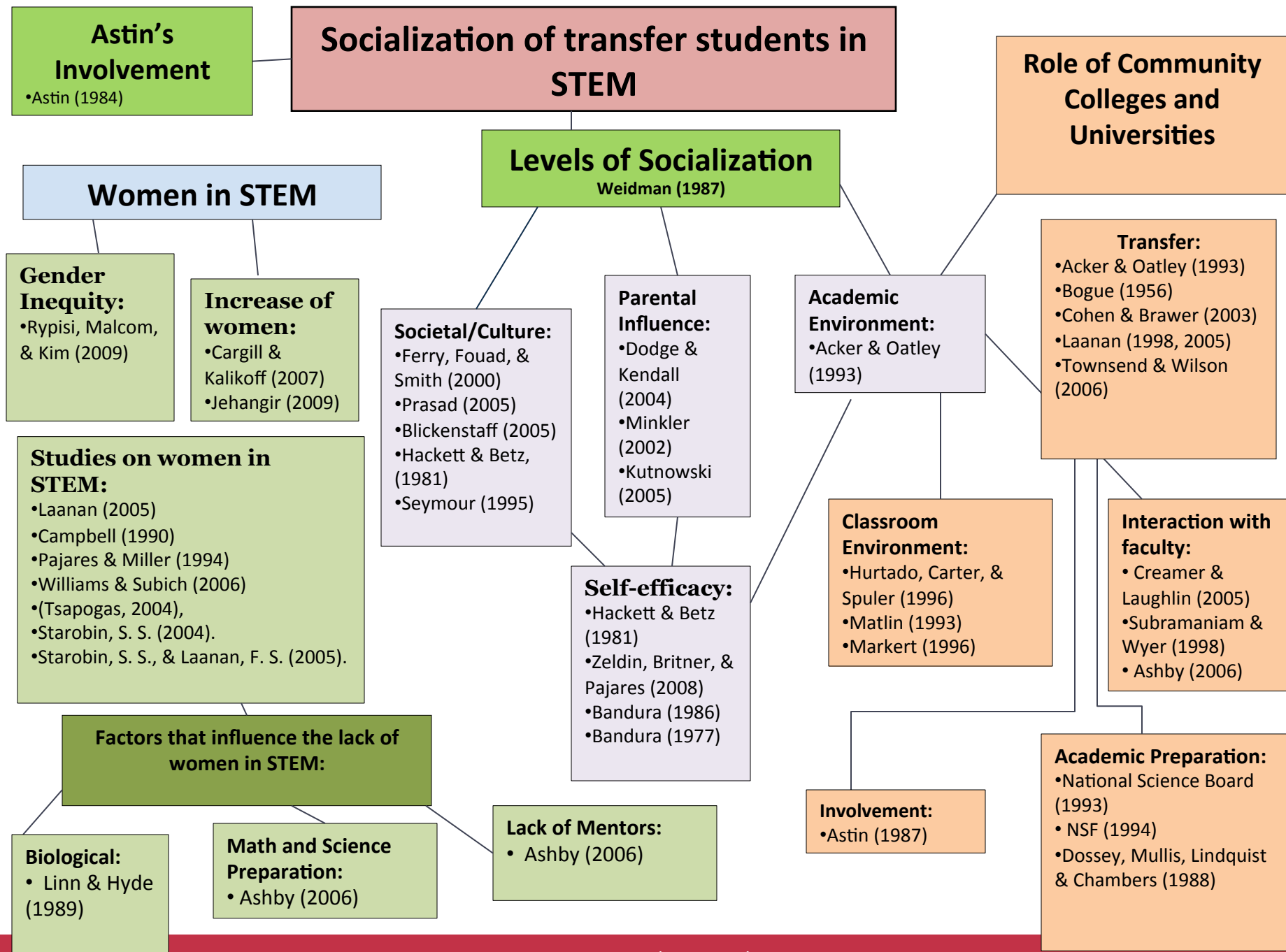


# Background

- The United States has been the world leader in the global science, technology, engineering, and mathematics (STEM) enterprise and has had the reputation of having the most educated workforce in the world (National Governors Association, 2007).
- In order for the United States to continue recruiting individuals domestically to meet the needs of the nation for scientists and engineers, the nation needs 400,000 new graduates in STEM fields by 2015 (Jones).
- Increasing the number of students, females in particular
  - Will provide a “diversity of perspectives in the search for knowledge and solutions to human problems” and will aid in “the ability to see questions and answers from many perspectives [which] will help make scientific explanations more robust and complete” (Blickenstaff, 2005, p. 383).
- Community colleges have been recognized as one of the leading institutions assisting in increasing the number of individuals pursuing bachelor degrees in STEM areas (Berger & Malaney, 2003).

# Problem

- Lack of women pursuing advanced degrees and careers in STEM fields
- Little research currently exists on the socialization of community college transfers, more specifically women, in STEM in the community college and university setting;
- There is a dearth of literature on the impact on socialization on the academic and social adjustment of transfer students.



# Purpose

- The purpose of this study was to:
  - Understand how female transfer students describe their overall socialization experiences in STEM majors.

# Theoretical Frameworks

- **Astin's (1984) Theory of Student Involvement**

The amount of physical and psychological energy that the student devotes to the academic experience.
- **Weidman's (1987) Socialization Theory**
  - As “the process by which persons acquire the knowledge, skills, and dispositions that make them more or less effective members of their society,” and is “considered to be a lifelong process” (Brim, 1996, p. 3, as cited in Weidman, 1987, p. 11).
  - Levels of socialization
    - Background
      - Gender, parental influences, non collegiate influences
    - Academic environments
      - Community college and university
        - » Mentors and advisors, faculty, classroom environments, clubs and organizations.

# Methodology

- **Qualitative component**
  - 1 hour, semi-structured interviews
    - 16 female transfer students
  - Interview protocol
  - Audio recorded and transcribed
  - Basic interpretive method & open coding to analyze

# Data Analysis: Qualitative

- Qualitative component
  - Themes were developed across all 16 individual interviews (Creswell 2009) analysis in qualitative research (open-ended questions and interviews).
    - Reading through all the data to “get a sense of the whole,” (Creswell, 2009, p. 186).
    - Coding is a processing of organizing into “chunks or segments of text before bringing meaning to information” (Rossman & Rallis, 1998). The “codes will be allowed to emerge during data analysis” (Creswell, 2009, p. 187).
    - Descriptions were generated from the coding process
    - Data were interpreted



# Background of Interview Participants

<u>Pseudonym</u>	<u>Academic Major</u>	<u>Classification</u>
Angie	Dairy Science Pre-Vet	
Brittany	Food Science, Culinary Science, & Dietetics	Junior
Courtney	Kinesiology	Senior
Dawn	Micro Biology	Senior
Erin	Aerospace Engineer	Senior
Kathy	Animal Science	Junior
Katie	Agriculture	
Kehly	Kinesiology	Senior
Kristin	Micro Biology	Junior
Kristina	Meteorology	Sophomore
Mega	Materials Engineer	Junior
Nichoel	Environmental Science & Spanish	Senior
Nicole	Animal Science	Junior
Nicole	Dietics	Senior
Rebecca	Liberal Science, previously Computer Science	Junior
Samantha	Horticulture	Senior

# Qualitative Findings

# Qualitative Findings

## **Four themes emerged from the interviews:**

- (a) Support systems,
- (b) Academic preparation,
- (c) Involvement, and
- (d) Perception of Gender Differences  
*Tension between denial and recognition*

# Qualitative Findings

## Support Systems

- **Peers**

*Prior to Transfer*

*“The most helpful thing with the transfer process was knowing someone who had transferred from that community college to a larger university within the state. Having that resource definitely helped with deciding my approach to the transfer process.”*

*After Transfer*

*“I had three really good roommates that I did not know before transferring and they would keep their eyes open for stuff that they would see on campus saying, ‘Kehly, there’s a Pre-physical therapy club meeting tonight, you should go’”.*

# Qualitative Findings

## Support Systems, continue

- **Faculty**

Balancing Life & School

*“I had a chemistry teacher that I was talking to him about how hard it was... working as a manager at night and doing the stuff at school... he went down to the tutor center and got me a job tutoring chemistry and math and I was able to quite my job...”*

Knowledgeable about the 4-year institution

*“ I found several professors at (the community college) to be incredibly helpful in um understanding what areas of science I could study at (4-year institution), a few of them were actually professors for both (4-year institution) and at (the community college) and um very helpful and encouraging for the transition to the (4-year institution).”*

# Qualitative Findings

## Support Systems, continue

- **Advisor**

Supportive

*“advisors through the Kinesiology program were really helpful in helping me transfer and know what classes I should take and help me figure out what my specific interests were to determine what route I should go into Kinesiology. So, that was really helpful.”*

Less Supportive

*“Well, I don’t have much to say about their advisors. So we’ll just leave it at that ... advisors were kind of just there. I knew what I wanted when I went otherwise I probably would still be there timid and hung around.”*

# Qualitative Findings

## Academic Preparation

- *Necessary Course Work & Doing Well*

*“as far as animal science... or possibly pre-vet um, your science classes, you should probably be on the top end of the class just to make sure that you’re getting the full understanding...”*

- *Rigorous Coursework*

*“Umm, I think community college professors could probably more information in the time given I don’t think that it, that I learned less through a course at (the community college) but I think that it wasn’t presented at the pace that it is here (4-year institution). So, maybe um, maybe a few more papers needed to be assigned...”*

# Qualitative Findings

## Academic Preparation

- *Administrative Tasks*

*“I think the biggest problem with transferring was um...actually it was probably uh, getting everything together. I had classes I was taking at the time and the homework load for that, and getting papers sent in, and saying hey can you transfer my credits and stuff. At the same time I had graduation approaching. So, I was really lucky I had my parents helping me out with that. Um, they had to handle most of the technical stuff because they wanted me to focus on my homework. Um, I didn't realize the time that it took for all that stuff to pile up at the end. There was a lot of paper work.”*

*“My advice... make sure that all their credits transferred toward the degree that they are going towards. I was informed they would all transfer, which was true... but a lot of them did not transfer towards my degree*



# Qualitative Findings

## Involvement

- *Student Organizations*

*“I was active in the biology club . . . very active. I organized most of the events and the fundraisers. I held the positions of VP, president, treasurer. I also started a new club . . . the Free Thinkers Club.”*

*“finding an organization that they can join so that they feel more, more part of the um, the um college experience, the university experience and also in doing so you can meet other people who might be able to answer some of your questions about other faculty and questions that you may have in general about where to go for certain issues or problems that you have when you first transfer here.*

- *Research Projects with Faculty*

*“I’ve kinda gotten close with some of the teachers. Um (one professor), I really like him. I’ve . . . them helped him with some research projects . . . a good opportunity to get experience and get to know him as well so I mean as (a) mentor.”*

# Qualitative Findings

## Perception of Gender Differences:

### *Denial and recognition*

- No Gender Differences

“I have not seen in any gender issues, I feel like everyone in our classes are treated the same being male or female, which I mean is great. For females that are in the science areas it’s hard for us to be like, it’s hard for females to feel like they could stand out academically but there are so many females in our classes that are doing better than males now and days. So, it’s great to see that there is no issues with gender in our classes, so.”

- Don’t be initiated by... your major

“Don’t let being a female or feeling like intimidated by... your major, don’t let that stop you just do it. You know people will be there to help you along the way.”

# Conclusions

- Although female students are entering post-secondary education environments with previous science and mathematical knowledge and experiences and are academically prepared in these areas, ***the role of faculty and academic advisors are extremely important in the adjustment process.***
- Additionally, the continued ***encouragement of female students to participate in classroom environments and become involved in campus organizations*** is essential to their overall positive adjustment and socialization process.
- Encouraging students to ***interact with faculty at the university and transfer as many credit hours as possible*** is also important during the adjustment process.
  - Explain to community college students which courses transfer as general education and which courses transfer for the academic major
- In addition, ***assisting students in researching prospective institutions during the transfer process and understanding their value to the university*** is vital in the academic and social adjustment process.

# Implications for Policy and Practice

- **Overall**

- Help faculty at the university to understand the importance of their role.
- Encourage students to become involved in social activities and in classroom activities.

- **Community Colleges**

- Hold students accountable for their own learning at the community college.
- Assess the rigor of the math and science courses at the community college to ensure that students are academically prepared.
  - More specifically the pace in which they are taught
- Encourage involvement at the community college and beyond.
- Encourage students to take as many math and science courses as possible.
- Assess the effectiveness of the advising centers for transferring
  - Better dissemination of transfer units

- **Universities**

- Help transfer students feel welcomed and as though they are an essential part of the university environment.
  - Assist in locating resources and classrooms

- **Female**

- Early exposure to math and science related areas are essential.
- Support systems that include family, faculty and advisors are necessary.
- Academic math and science preparation important.

# Recommendations for Future Research

- Conduct longitudinal studies
  - follow students from early grade school throughout their postsecondary education/pre-collegiate hobbies.
- Seek qualitative information that is needed at every stage of the student's socialization
  - to understand how students are interpreting their socialization. Understanding this interpretation early in the socialization process will highlight success factors as well as adjustments that may need to be made.
  - During the interviews, some participants experienced tension in discussing gender differences, so ethnographic observations maybe needed to understand more about gender, classroom behaviors, and leadership roles
- Conduct studies on past community college transfer students who are currently in a STEM career to assess their early socialization processes.
- Conduct qualitative research on STEM and Non-STEM students
  - to understand the socialization similarities and differences among these two groups.
- Explore university faculty perceptions of transfer students.
- Explore the socialization experiences of females of color in STEM majors.

# Lingering Questions

Female STEM Transfer students did not openly identify gender inequity as a barrier in their studies. And yet... there is gender inequity.

## WHAT ABOUT THE MEN?

- How have men been socialized in STEM education? In what ways have faculty members (un)intentionally reinforced gendered inequities?
- Are male students aware of gender inequity?
- What studies can be conducted to learn more about male students' perceptions of female students in STEM fields?
- What interventions are possible to better educate men regarding gender inequities? In STEM education?

## WHAT ABOUT TRANSGENDER STUDENTS?

- How can we, faculty and staff members, better serve transgender students, specifically in STEM education?



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