

# Encouraging Women to Become CS Teachers

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# Problem

- Quantity concerns
  - ▣ The numbers fall short of meeting the need for highly qualified CS graduates (Microsoft, 2013).
- Quality concerns
  - ▣ Untapped potential of female college students
    - have exceeded those of males since 1988 [NCWIT, 2014]
  - ▣ Increases in the number of females in some Science, Technology, Engineering and Mathematics (STEM) fields [NSF, 2013].
  - ▣ Females are seriously underrepresented in CS [NSF, 2013].

# Lack of Women in CS

- Limiting the diversity of the workforce in the rapidly growing global economy (Jackson, Starobin, Laanan, 2013)
- A “social justice” issue (Ong, Wright, Espinosa, Orfield, 2011)

# Efforts

- **Current Research** (Klawe, 2013)
  - Female interest
  - Confidence
  - Sense of belonging
- **The National Center for Women & Information Technology: Pacesetters** (2014)
- **K-12 education as a dynamic to prepare and motivate females to pursue CS careers** (Downes, Looker, 2011)

# Role of the K-12 Education

- ▣ Lack of interest in STEM careers can be attributed to discouragement experienced in K-12 years (Malcom-Piqueux, Malcom, 2013)
- ▣ Female CS teachers could:
  - ▣ be role models
  - ▣ influence students' attitudes, interests and career choices (Malcom-Piqueux, Malcom, 2013)
    - Female high school teachers had a crucial influence on female students' career selection (Bottia et al., 2015).

# Purpose

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- **Need:** Women representation in CS teaching.
- **Purpose:** This study aims to identify the factors that encouraged female pre-service teachers to participate in a CS education licensure program.

# Method

- The early phase of an ongoing longitudinal study.
- A social justice issue: The current social system fosters inequality between males and females in the computer science field due to cultural norms.
- Women should not “accept their [devalued] social status as natural” in IT (Knezek, Christensen, Tyler-Wood, 2011)
- Critical methodology (Carspecken, 1996) as the meta-theoretical grounding for this study

# Setting

- 21-credit-hour undergraduate teacher education program at a large Midwestern state university
- Add-on licensure to become a computer educator and technology coordinator in K-12 schools.
- The number of female students exceeded that of males in the program beginning in 2013-2014 academic year.
  - 2 out of 8 (25%) students in the 2012-2013
  - 7 out of 13 (53%) in the 2013-2014
  - 8 out of 12 (67%) in the 2014-2015 school years

# Data Collection

- Spring 2015 semester
  - ▣ Four 2-3 hour observations of a programming class interactions during the semester
    - thick description of the context
    - major interactions (e.g. facial expressions, gestures, body movements, key words, choices, exchanges in conversations, responses to questions etc.) and times
  - ▣ Interviews with five female pre-service teachers
    - I am wondering what advantages the additional computer education licensure offers for the students in the school of education
    - Tell me about the one or two most important factors that motivated you to have the additional computer education licensure.
    - Tell me about your future plans with regards to having the computer education licensure.

# Data Analysis

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- Nvivo software
- A scholar in inquiry methodology reviewed the anonymous data with the researcher.

# FINDINGS

## □ *Marketability: Opportunity to strengthen resumes for job searches*

Lauren: “it makes you more marketable... it would give me the opportunity to put me on a ranking above someone else”

Kelly: “I feel like just when I apply for a job, I will be like, hey I am certified at math but I also have this computer license addition. So I can teach additional classes or **I can be like [an] advocate of the school** to implement technology.

# FINDINGS

## □ *K-12 and Undergraduate Experiences*

### □ *K-12*

Emily: “My interest goes to my high school years. I designed websites, learned Front Page.” “When I was in high school, I was the person everyone asked. Emily, how do you fix this, how do you install some things, what do I do.

### □ *Undergraduate*

Lauren: *“I had no idea what Prezi was before I took [the technology integration course]. I had no idea what Glogster was, I did not know that you can make a Google page, just simple things like that; it broadened my horizon. You don’t realize that there is so much more until you take a class like that and you realize, wow people are doing amazing things.*

Kelly, Sarah, Emily had interest from the required tech integration course. Kelley stated: “My interest goes to the technology integration course.”

# FINDINGS

## □ *Role Models*

### ▣ Family members

Sarah: I had a computer since I was really little. My dad was an IT person and did developmental things with computers back in the 90s. So I always had a computer and my dad always showed me

### ▣ Teachers

Emily: *“First of all it started in seventh grade when I took a keyboarding class and I really liked the teacher because she was really good. So I liked computers with that teacher and I helped her”*

# FINDINGS

- *Female Interest on Visual Tools: Promoting the tools and resources computer science offers in ways that capture female students' interest.*
- *Leslie: “[A] good entry would be like Adobe Photoshop, having a combined course partly something that they can do, I know girls like Photoshop and editing pictures and doing their own things, and integrating programming as part of it, that might introduce it to them and they can see that it is not that bad.”*

# DISCUSSION

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- Importance of positive experiences and of effective role models
- Educational technology courses as a place to catch female interest
  - Starting with the tools that introduce and grasp female interest to CS

# LIMITATONS and CONCLUSION

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- Small number of female students in the target course.
- Aim to continue in future semesters of the certification

# Q&A



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