Are Females Disinclined to Tinker in Computer Science?

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Motivation

Previous research shows gender-based differences in tinkering in areas such as

- Human Computer Interaction
  • e.g. (Beckwith et al., 2005), (Burnett et al., 2008)

- Early Science Education
  • e.g. (Brotman & Moore, 2008), (Jones et al., 2000), (Parsons, 1995)
Research Questions

1. What is tinkering in Computer Science?
2. Are females less likely to tinker than their male peers?
Questionnaire and Participants

- administered to undergrad CS/Computer Engineering majors
- 93 valid responses (33 female, 60 male)
- 33 closed-ended questions
- 2 open-ended questions
Questionnaire topics

• ‘Tinkering behaviors’ in hardware and software
  – Software: Practices in labs and assignments (15 questions)
  – Hardware: ‘At home’ tinkering (2 questions)

• Interest and experience with computers/programming (9 questions)

• Definition of tinkering/self-identifying as a tinkerer or a non-tinkerer
Tinkering with Hardware

More males have experience with micro-controllers/single board computers
(males 25%, females 6%, \( t(88) = -2.59, p = .011 \))

More males have experience (de)constructing a computer
(males 79%, females 30%, \( t(60) = -5.15, p = <.001 \))
Tinkering on Labs & Assignments

Males more likely to change code that is given
\( (t(77) = -3.23, \ p = 0.003, \ d = 0.70) \)

Females more likely to attend office hours
\( (t(82) = 2.63, \ p = 0.010, \ d = 0.60) \)

No other significant differences between genders
What does it mean to tinker with computers?

according to males...

• Tinkering associated with:
  – ‘modification’ (in 28% of M, 15% of F responses)
  – ‘taking apart/building’ (26% M, 15% F),
  – ‘customization’ (12% M, 4% F)
  – ‘deviation from intended purpose’ (14% M, 4% F)

• Males focus on the **nature** and **substance** of tinkering

• Males’ responses longer and more technical

Notes: No statistical significance (just trends)
We had fewer female responses
What does it mean to tinker with computers?

according to females...

• Tinkering associated with:
  – ‘improvement’ (in 23% of F, 12% of M responses)
  – ‘understanding’, (30% F, 16% M)
  – ‘playing around’ (35% F, 18% M)
  – ‘exploration’ (31% F, 22% M)

• Females focus on **motivation** and **general purpose**

• Females’ responses briefer

Notes: No statistical significance (just trends)
We had fewer female responses
Are you a tinkerer?

Males

- Yes: 70%
- No: 26%
- Maybe: 4%

Females

- Yes: 15%
- No: 46%
- Maybe: 39%
Factors that could affect tinkering behaviors

Factors effecting tinkering behaviors

1. Risk taking
   • Known to vary with gender (Gustafson, 1998), (Burnett et al., 2008)

2. Confidence
   • Related to applied problem solving (Vermeer, Boekaerts, & Seegers, 2000)

3. Goal Orientation
   • Females look for purpose in Computing (Fisher, Margolis, & Miller, 1997)
Further Research

• Further explore the meaning of tinkering in CS
• Investigate beneficial/detrimental tinkering behaviors