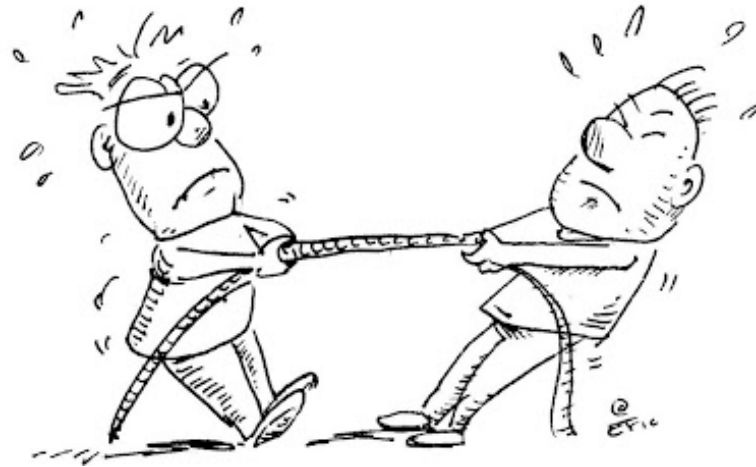


# Improving Teamwork Skills in Geological Engineering

## Some Early Results



**Susan Hollingshead**

Geological Engineering Program Instructor  
Earth, Ocean & Atmospheric Sciences Department

**Kristi Carey**

Research Assistant  
Centre for Teaching, Learning & Technology



# Why study teamwork skills?

- One of 12 “graduate attributes” required by Canadian Engineering Accreditation Board (CEAB)
- Valued by employers (e.g., commonly listed as necessary skill in employment postings)
- Necessary for success in capstone design project course
  - Intensive teamwork experience



# Capstone Design Project Course

- New in 2011/12, replaced individual theses
- Common to many engineering undergraduate programs in senior year
- Students work in groups of  $4 \pm 1$  on open-ended design projects from Sponsors
- Core course (6 credits)
- Teams are selected for diversity by instructor
- Teams work together September to April



# Interventions

- Personality (Type Focus) Workshop
- Teamwork Workshop
- Group Dynamics
- Effective Feedback
- Conflict Resolution
- Negotiation
- Behaviourally Anchored Peer Evaluation  
(Comprehensive Assessment of Team Member Effectiveness)

# Research Tools

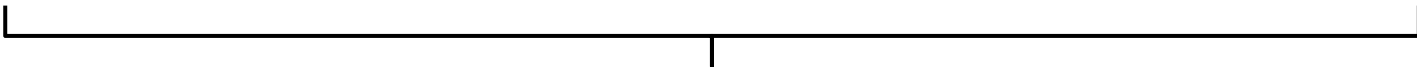
Subject is entire 4<sup>th</sup> year GEOE cohort

Control group is 4<sup>th</sup> year mining eng. cohort

1. Pre-/Post-course survey (subject & control)
2. Mid-course survey
3. Two focus groups
4. Writing assignment about teamwork
5. Two peer evaluations, including comments

Items 2 through 4 apply to subject group only

# Pre-/Post-Course Survey

- Anonymous, but with provision for ‘matching’
- 24 engineering and teamwork-related skills  
3 questions on each:
  - How **IMPORTANT** is this skill in engineering?
  - How **CHALLENGING** is this skill to acquire?
  - How **CONFIDENT** are you in your current skills in this area?
- Each rated on similar Likert scale, where:  
1=Not, 2=Slightly, 3=Moderately, 4=Very and 5=Extremely  
  
Important, Challenging or Confident,  
respectively



# Pre-/Post-Course Survey Questions

- Drawn from:
  - CEAB descriptions of “graduate attributes”
  - Capstone course learning objectives
  - Other instruments to measure teamwork skills\*
- Some repeated using modified wording
- Order meant to be “random”

e.g., Team Skills Survey, Grymonpre et al. 2010



# Example Questions

To be able to...

- Appreciate the value of diversity on a team
- Promote a team culture of honesty, openness and trust
- Produce clear technical documents
- Manage conflict productively in a way that preserves relationships
- Educate yourself to maintain professional competence





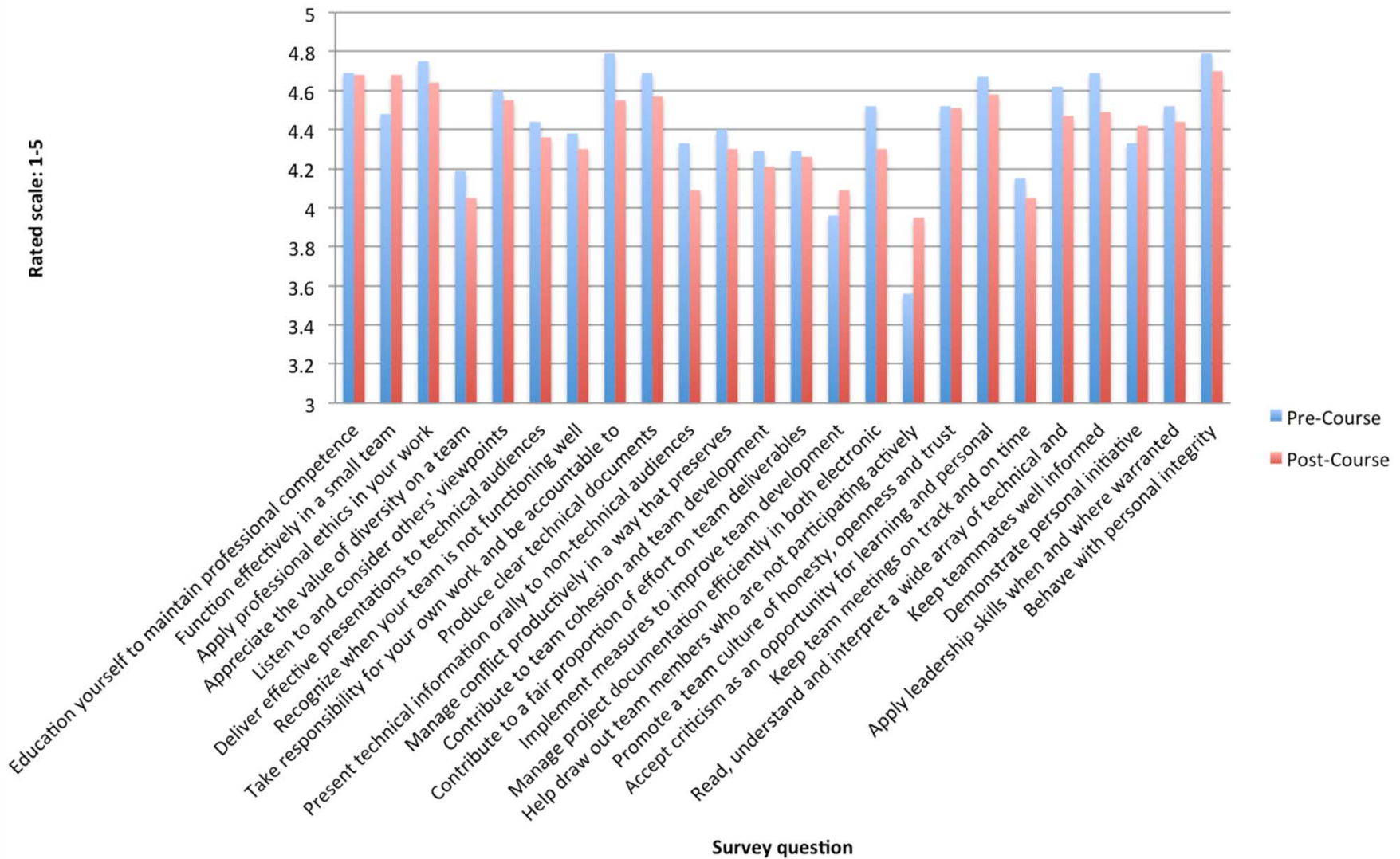
# Some Early Results

- Pre-course survey comparison of groups
  - Subject and control groups very similar
- Pre-post comparison of subject group
  - Noticeable differences before/after course...
  - Little change in opinion on IMPORTANCE (<+0.1)
  - Increased rating on degree of CHALLENGE (+0.2)
  - Greater increase in rating of CONFIDENCE (+0.3)

# What is important?

- 3 increased, 10 decreased, 11 little change (<+0.1 overall)
- Largest increase (0.4)
  - Help draw out team members who are not participating actively in team meetings
- Second largest (0.2)
  - Function effectively as a member of a small team
- Less important than originally thought (-0.2)
  - Presenting technical information orally

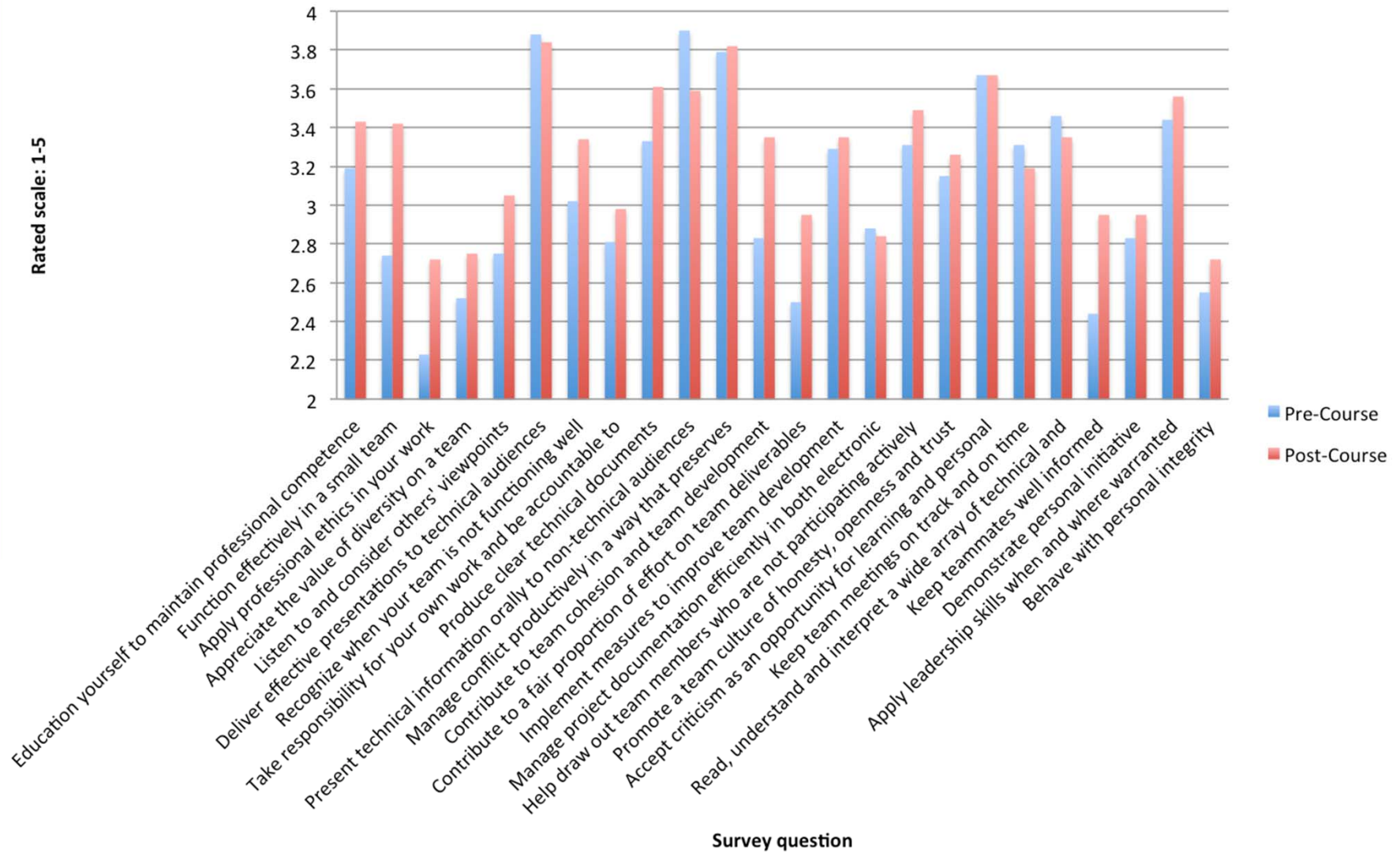
## How important is this skill in professional engineering?



# What is challenging?

- 15 increased, 4 decreased, 5 little change (+0.2 overall)
- Largest increase (0.7...0.4)
  - Function effectively as a member of a small team
  - Contribute to team cohesion and development
  - Apply professional ethics in your work
  - Contribute a fair proportion of effort on team deliverables
- Less challenging than originally thought (-0.3)
  - Present technical information orally

## How challenging is this skill to acquire?

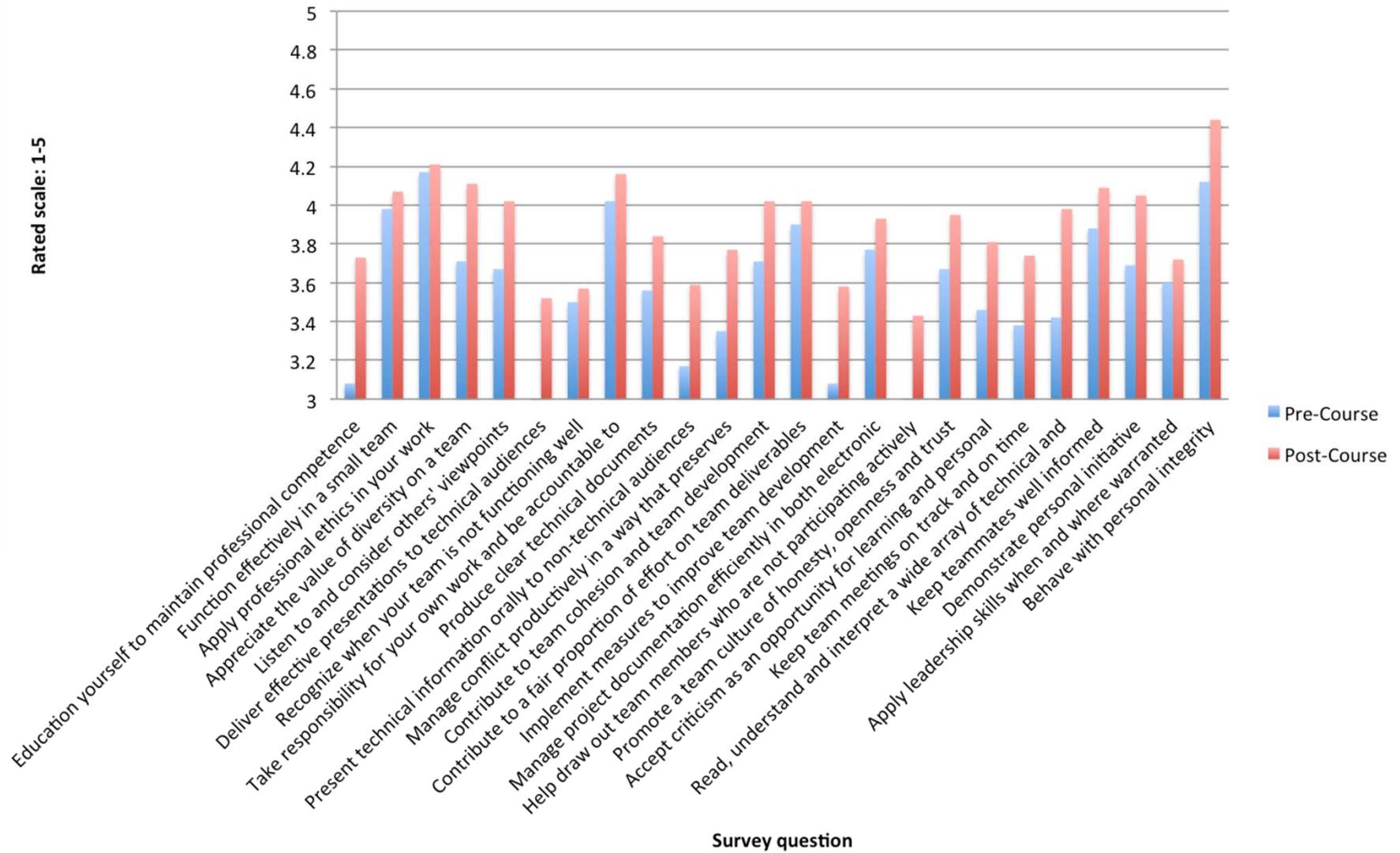


# How confident are you?

- 21 increased, 3 little change (+0.3 overall)
- Largest increase (0.7)
  - Educate yourself to maintain professional competence
- Second largest increase (0.5)
  - Read, understand and interpret information
  - Deliver effective presentations to technical audiences
  - Help draw out team members who are not participating actively in meetings
- Less confident than the beginning of year...
  - Absolutely nothing!!



## How confident are you in your current skills in this area?





## Student Reflections on Teamwork

- “Teamwork is more than just having compatible personalities, and being able to divide up work evenly for the project.”
- “I did not expect to feel so supported by my team members as I did.”
- “Another point that has helped our success as a team has been social interaction outside of team meetings.”





## Student Reflections on Teamwork

- “One of the most important things I will take away from this teamwork is how we have accomplished more by caring about one another...”
- “Valuing the work of others and taking an interest in their personal lives will foster a great sense of comradery that will help your group be successful.”

# Analysis Still To Come

- Comparison of pre-/post-course survey results for individuals (matched “anonymously”)
- Comparison of pre-/post- results for control group itself, both as a class and individually
- Comparison of subject and control group results from post-course survey
- Adjustment of in-class interventions
- Repeat of pre-/post-course surveys (2016/17)
- Analysis of impact of interventions
- Improvement of “anonymous” matching system

## Selected References

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