# Does Mentoring Develop Deep Skills in Undergraduate Mentors?
## A Pilot Study

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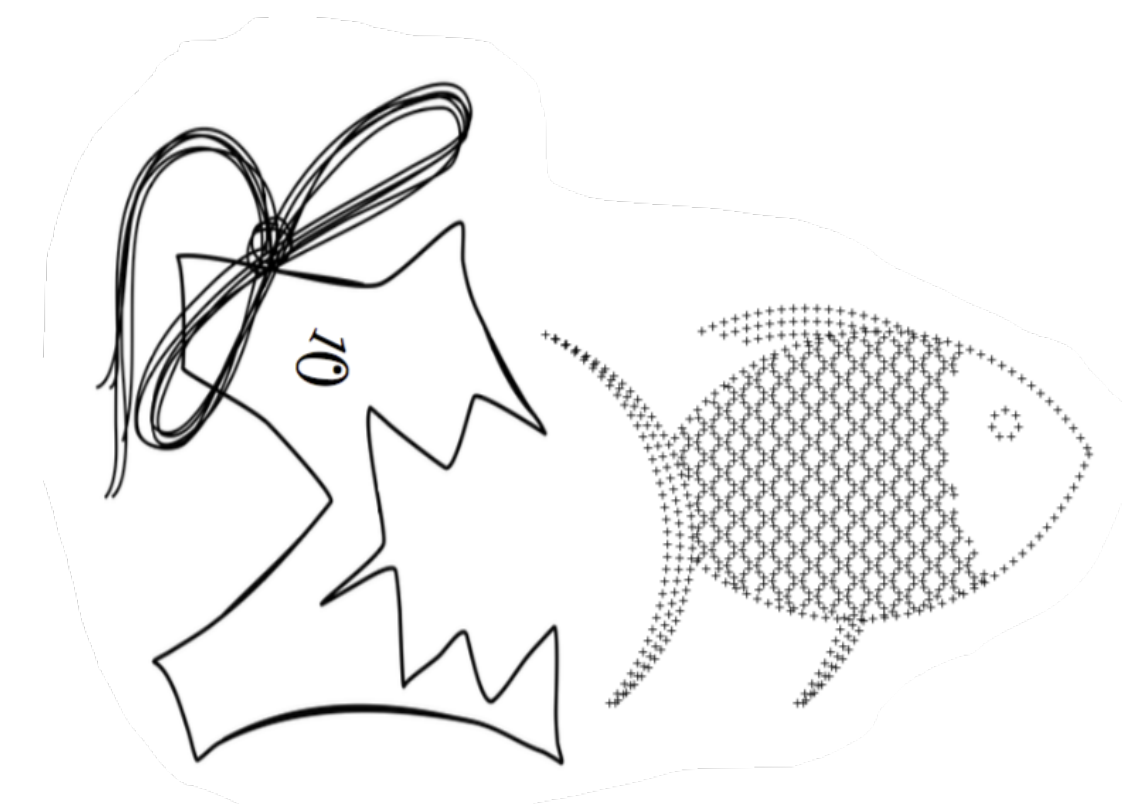
## Introduction

"Software: Tool for Change", an NSERC PromoScience-supported outreach program at McMaster University offered internship-style camps to students in Grade 5-8 this summer. Using Elm, a functional programming language, students learned fundamental concepts used to make web-based applications. They engaged in lessons about graphics and animations, design thinking, cognitive science, and Petri nets. Undergraduate students served as counsellors and mentored the campers through this process.

## Objectives

- Explore the perceptions and opinions of undergraduate students regarding deep skills
- Have open discussions to assess strengths and weaknesses and set goals for improvement
- Observe and examine the impact of mentoring through the internship-style summer camp on the development of deep skills

## Methods

- Participants:
  - 11 undergraduate mentors, involved in the camp as instructors or supporting staff
- Interviews:
  - Two interviewers conducted interviews with each mentor pre-, mid-, and post-camp.
  - Both interviewers were present for all interviews and participated in both asking questions and taking notes.
- Coding:
  - One interviewer synthesized and transcribed all the interview notes.
  - The mentors received a copy of the interview notes for member checking.
  - Two interviewers coded all the member checked notes for major themes.
- Analysis:
  - Notes were assessed based on the coded categories for major trends and themes.

## Results

- Interview major themes:
  - What do you expect to learn?
    - Leadership: allocating roles/work
    - Teamwork: conflict resolution, age-dependent development
  - What do you hope to learn?
    - Communication: speaking to different communities, effective use of body language, reducing verbal tics
  - Teamwork
    - Factors for successful experiences: good time management, members of the team are engaged/want to be there, equally/fairly divided work
    - Factors for unsuccessful experiences: social loafing, laziness, confusion, lack of confidence, unwilling/unable to ask questions,
    - Opinions: "Teamwork is natural/necessary.", "Is it important to have a team with diverse and complimentary skills.", "Working with individuals with different work habits is difficult.", "Incentives, positive reinforcement, or a sense of competition can promote good teamwork."
  - Challenges
    - Grasping an understanding of the kids' baseline experience/capacity and determining whether they understand the lessons.
    - Maintaining the kids' attention and moderating team/group dynamics.
    - Mentors might be inexperienced with the content.

Table 1: left, legend for figures c) and d); right, legend for figures b) and e)

| Score | Value | Score | Value |
|---|---|---|---|
| 1 | Strongly disagree | 1 | Poorly |
| 2 | Disagree | 2 | Somewhat well |
| 3 | Undecided | 3 | Adequately |
| 4 | Agree | 4 | Well |
| 5 | Strongly agree | 5 | Extremely well |

Table 2: Comparing pre- and mid-questionnaire average scores for the mentors

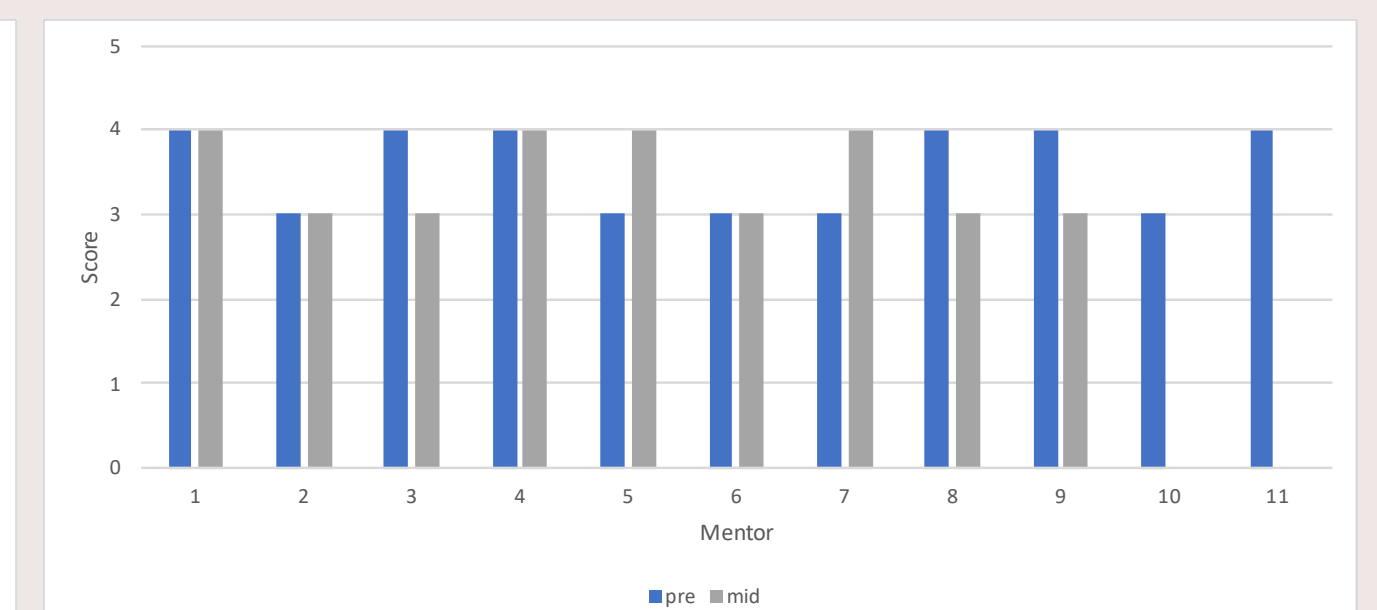| Question # | Pre-questionnaire average score | Mid-questionnaire average score |
|---|---|---|
| 1 | 8.18 | 7.89 |
| 2 | 3.55 | 3.44 |
| 3 | 3.55 | 3.44 |
| 4 | 3.82 | 4.00 |
| 5 | 5.00 | 4.89 |

## Results cont'd
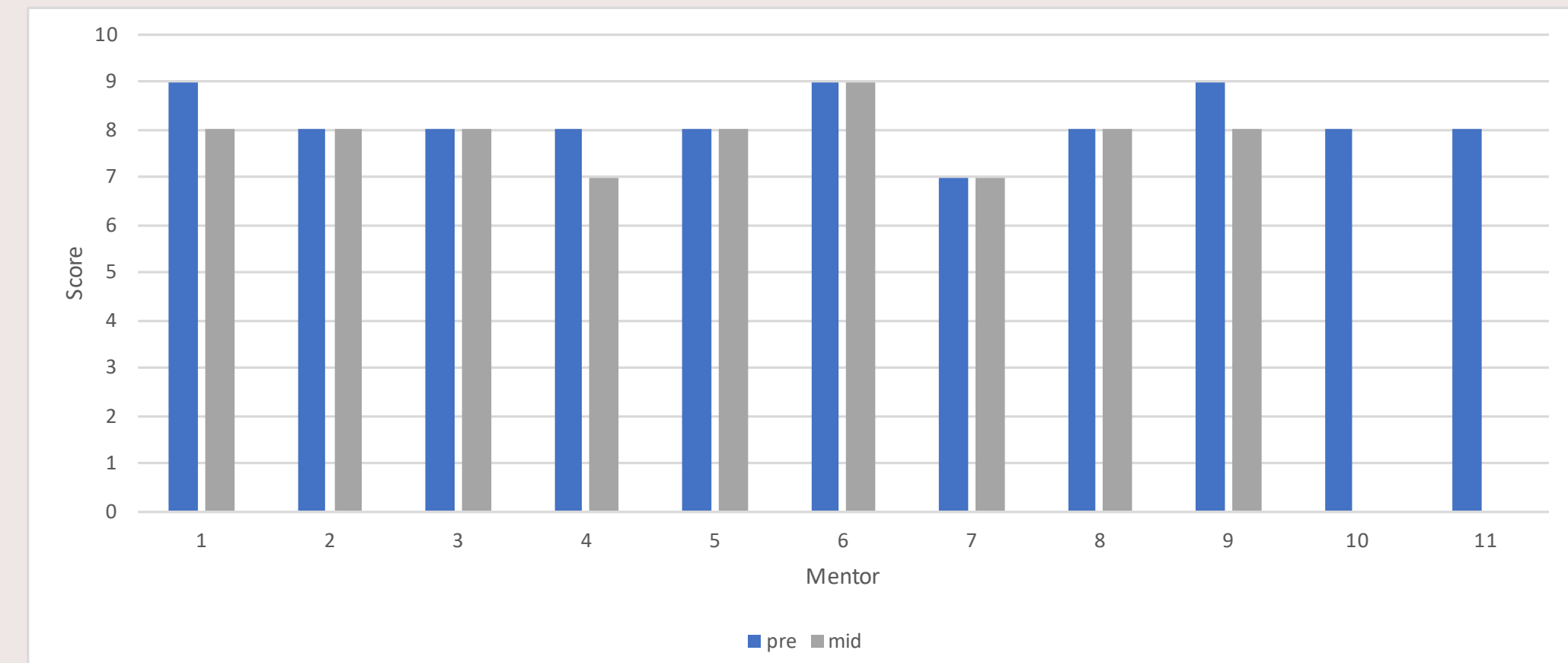
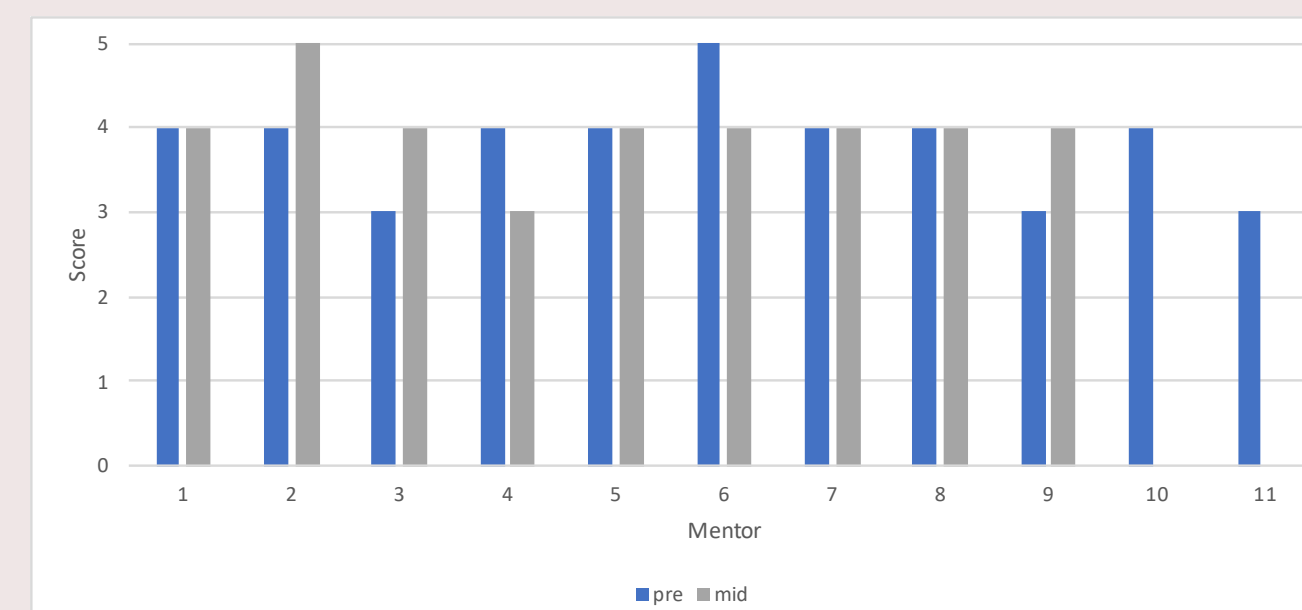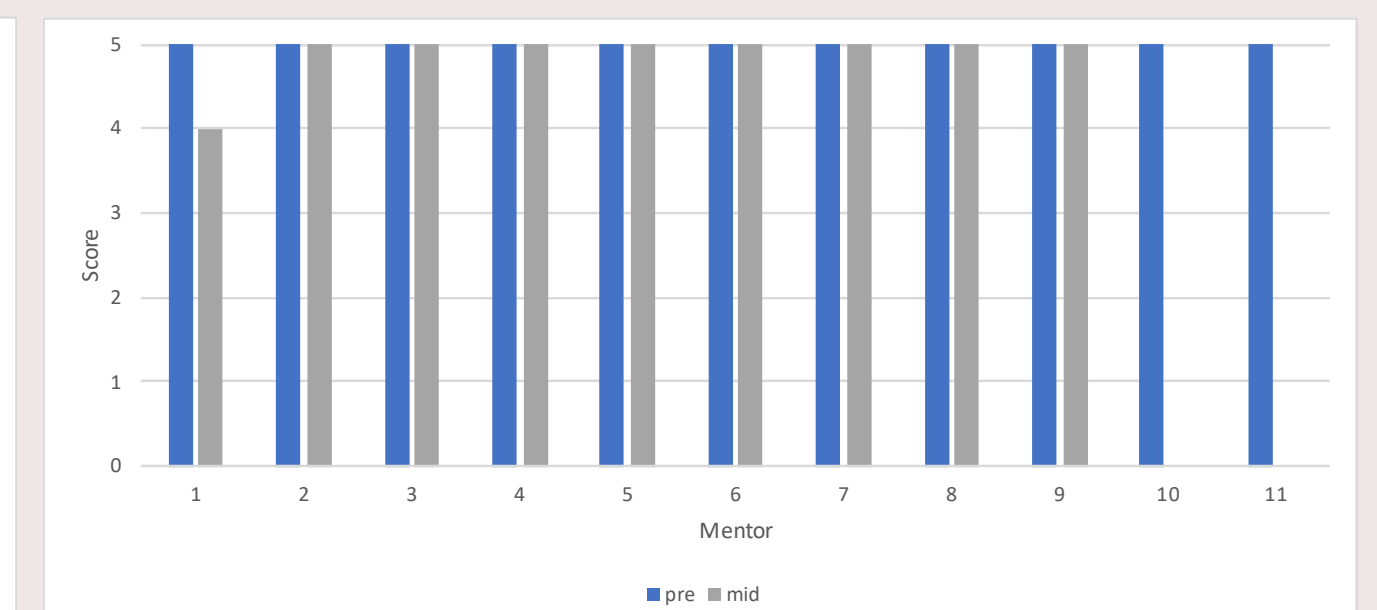

(a)
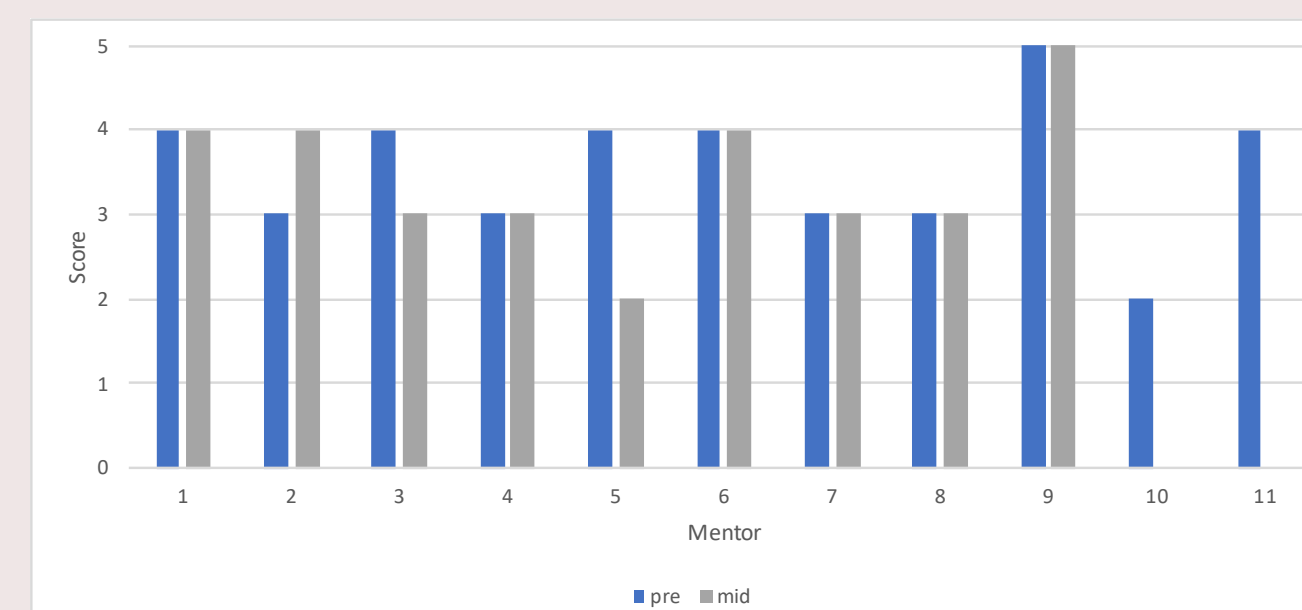


(b)



(c)



(d)



(e)

Figure 1: Pre- and mid- questionnaires for each mentor.
a) Q1: On a scale of 1 to 10, how well do you believe you work in a team?
b) Q2: Social loafing is the phenomenon when a person exerts less effort to achieve a goal in a group than they would if they were working alone. The primary reason why teams fail to function well is because member(s) of the team are victim to social loafing.
c) Q3: Teams work together to accomplish a common goal. Effective task dispersion implies a fair distribution of workload as well as skill to task pairing. How well do you think you split tasks amongst members in a team?
d) Q4: The needs of a project often change as they progress and develop. How well do you think you adapt to the changing goals of a project?
e) Q5: In a team, members often need to discuss project goals, progression, and changes. Good communication is the most important factor to the success of a team.

## Discussion & Future Work

- Pairing university students to this unique mentorship experience fosters the development of a variety of soft skills invaluable to workplace environments.
- Anecdotally, mentors have described teaching as a rewarding process, where they develop a deep understanding of the content and a tactful approach to meet their mentees' unique needs.
- Communication and leadership were major, recurring themes; Namely, our undergraduates found success amongst themselves and within the kids when they worked together.

## Acknowledgements