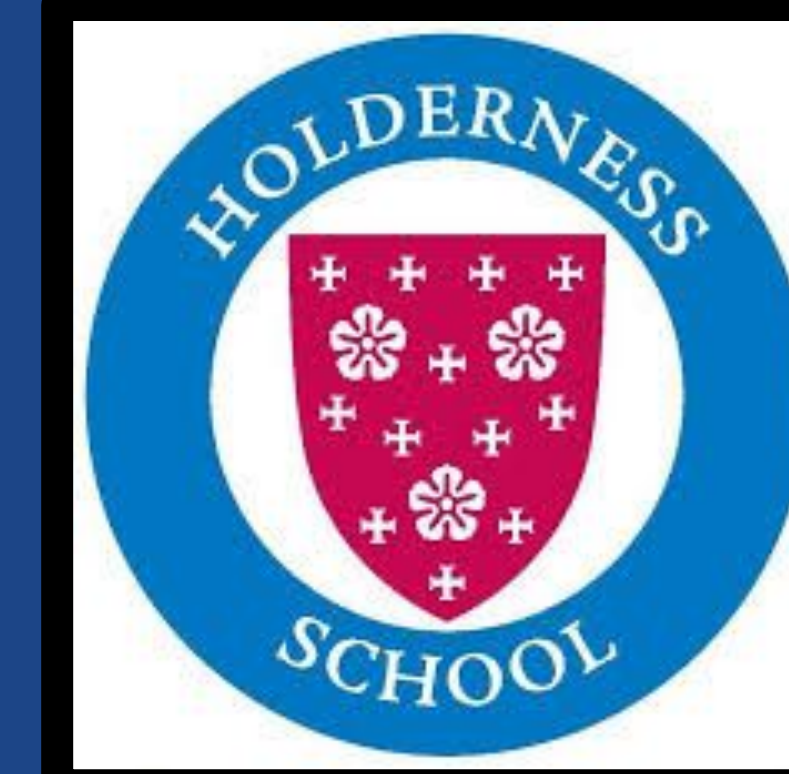




THE EFFECTS OF A TEACHER PRESCRIBED PROBLEM-SOLVING PATHWAY ON NOVICE PROBLEM-SOLVERS IN A CHEMISTRY CLASSROOM

Randal Houseman, Holderness School, 2019-2020



Data

Introduction

- Expert problem solvers first try to understand the concepts and then work on a solution.
- Novice problem solvers often start by trying to plug numbers into equations.
- Expert problem solvers up-front preparation time is longer than novice problem solvers.

Focus Questions

- Will a clear and manageable problem-solving pathway provided to the students with the appropriate scaffolding help more students implement problem-solving strategies in high school chemistry.
- What impact will this process have on student attitudes and confidence with problem-solving?

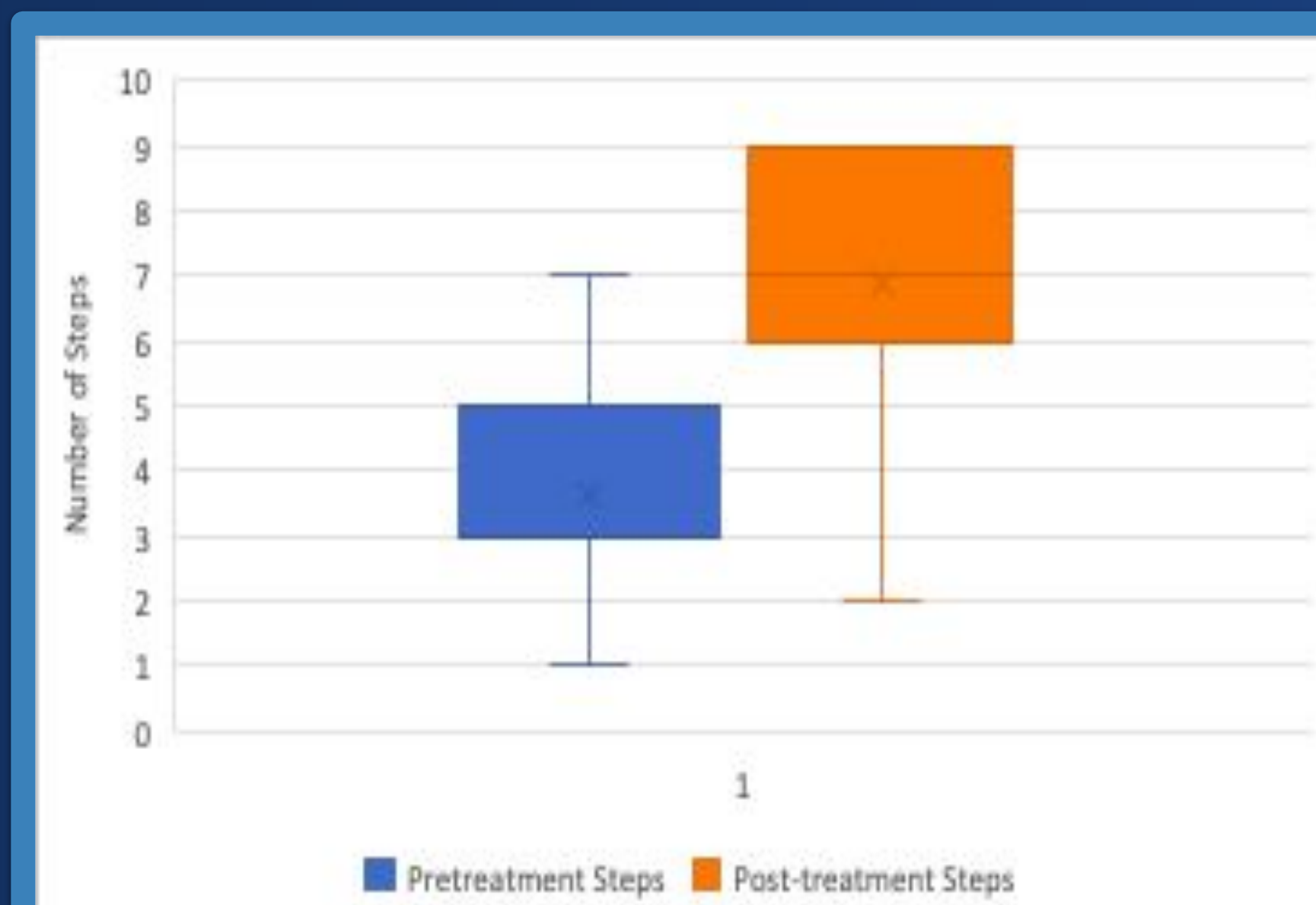
Claims Evidence Reasoning

Pathway impacted strategies students use to solve problems

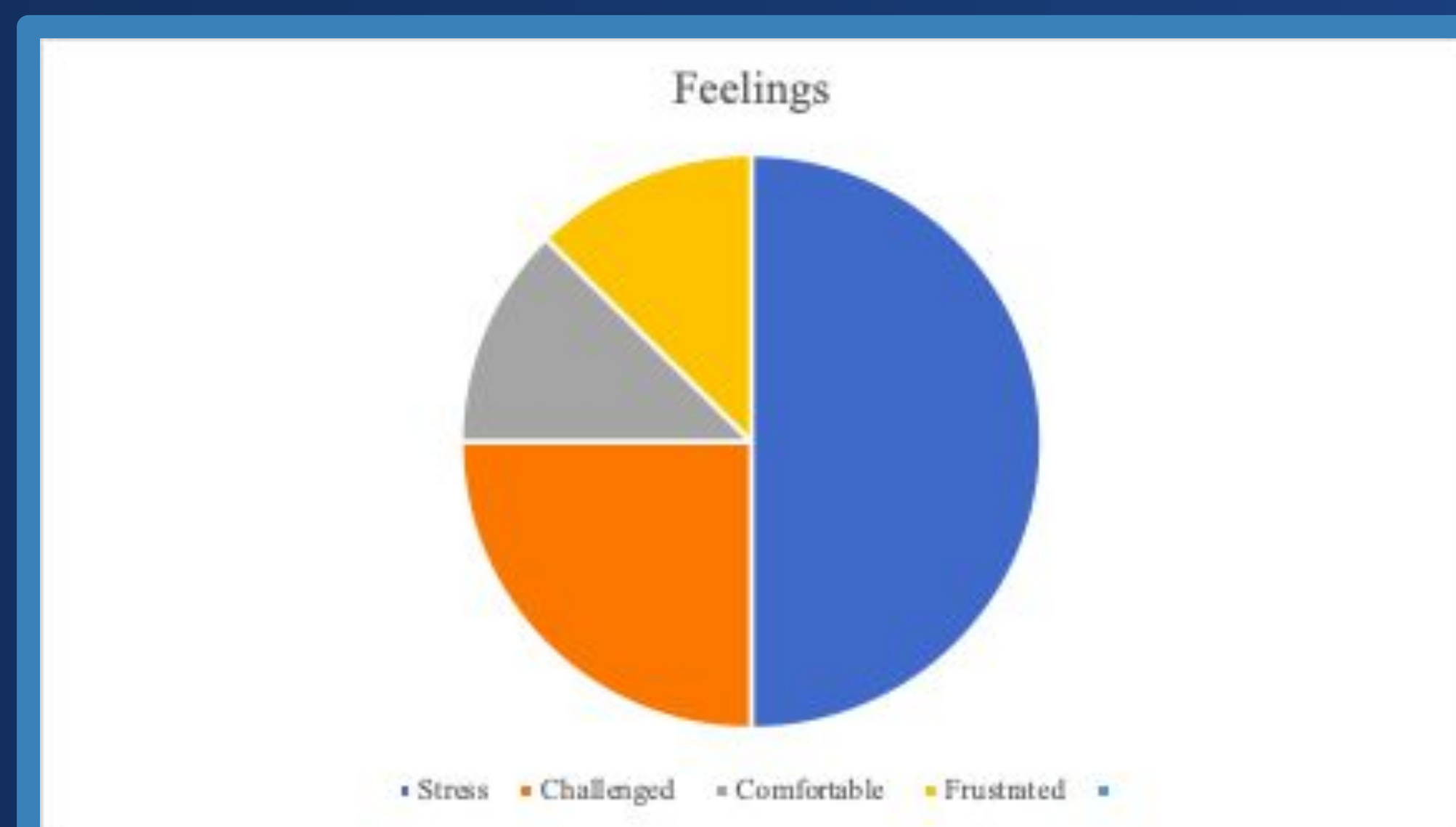
- Students increased the number of steps on post treatment Documented Problem Solution
- Students continue to use most of the pathway 1 month post-treatment

Pathway did not have a positive impact on student confidence

- More than half of the respondents had negative feelings about solving unfamiliar problems



Numbers of Steps Included in Documented Problem Solutions.



Student Post-treatment Reflections on Feelings When Problem Solving.

- "When the problem looks different or strange I freak out and don't know how to solve it so I sometimes give up."
- "I get frustrated (because I know I have the knowledge but can't seem to put everything together)"
- "Sometimes it can stress me out and I tend to move on to the next problem."

Background

- Holderness School is an independent boarding high school located in central New Hampshire.
- 31 Honors chemistry students were involved in the study
- Problems include stoichiometry, gas laws, and solution stoichiometry..

Methodology

- Students approach to problem solving was assessed before treatment
- Students were given a problem-solving method and used method for three weeks
- Mandatory use of method was removed
- Students approach to problem solving assessed after treatment

Values

Sharing information with students about:

- The research on problem solving
- Metacognition or thinking about one's thinking
- Results of study

Stress levels of students

- Must better understand causes of student stress
- Can't effectively improve problem solving without first reducing stress