

# USING METACOGNITIVE STRATEGIES TO IMPROVE STUDENT PERFORMANCE AND CONFIDENCE IN HIGH SCHOOL CHEMISTRY

## BACKGROUND INFORMATION

- Students are often unsure as to what they are expected to know and what information is superfluous for summative assessment purposes
- Reflective practices can increase student metacognitive awareness of their learning
- Developing a greater metacognitive awareness in students of what is required of them can lead to increased academic performance
- The goal was to inform students of curricular expectations, teach metacognitive strategies for students to evaluate their own learning, and monitor student performance and confidence levels in grade twelve chemistry

## METHODOLOGY

- Students were surveyed pre- and post-treatment to gauge their understanding of metacognitive practices and ability to use them to reflect on their academic performance.
- Student assessments were compared between a pre-test and a unit test and monitored for changes in ability against specified curricular objectives.

Table 1. *Data Collection Tools*

Research Questions	Data Collection Tools		
<u>Primary Question:</u> Will the introduction of metacognitive strategies for studying improve student summative assessment scores in high school chemistry?	Pre and post unit Student Attitude Survey	Unit pre-test and unit test scores	Student Interviews
<u>Sub-question:</u> Will the introduction of metacognitive strategies for studying increase student confidence in their ability in high school chemistry?	Pre and post unit Student Attitude Survey.	Teacher Observations	Student Interviews

## STUDENT COMMENTS

*“I know what to study but it is difficult to know where to start with it.”*

*“I wish there was more reflection in the unit so I could start earlier reviewing what I am not understanding”*

*“Why do I have to do this? Why isn’t it optional?”*

## FINDINGS

- Summative performance generally increased but not in a uniform manner when compared with curricular objectives.
- Curricular outcomes that were emphasized in class between the pre-test and the unit-test saw the greatest score improvements.
- Scaffolding reflective practices allowed students to better self-assess their understanding of required curricular objectives.
- Implementing guided reflections and pre-testing led to a decrease in student self-reported confidence of their knowledge and abilities in chemistry.
- Students stated that they have better metacognitive awareness of their abilities and areas for improvement as the reflections made them acknowledge their strengths and weaknesses.
- Students enjoyed brief, scaffolded reflections when they were utilized in class.

## FOCUS QUESTIONS AND DATA

1. Will the introduction of metacognitive reflection strategies for studying improve student summative assessment scores in high school chemistry?

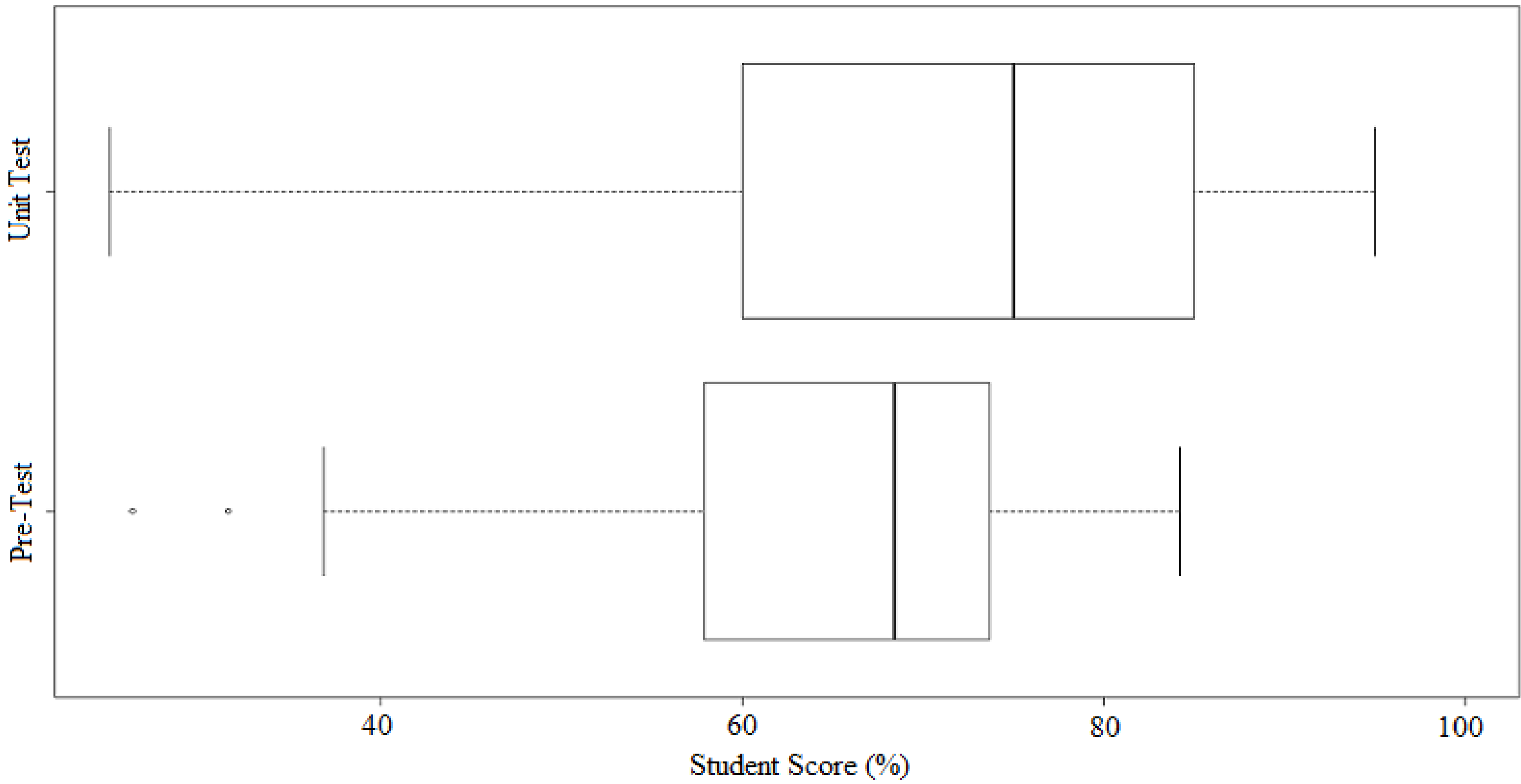


Figure 1. Comparison of unit pre-test and unit test scores ( $N=49$ ).

2. Will the introduction of metacognitive reflection strategies for studying increase student *confidence* in their ability in high school chemistry?

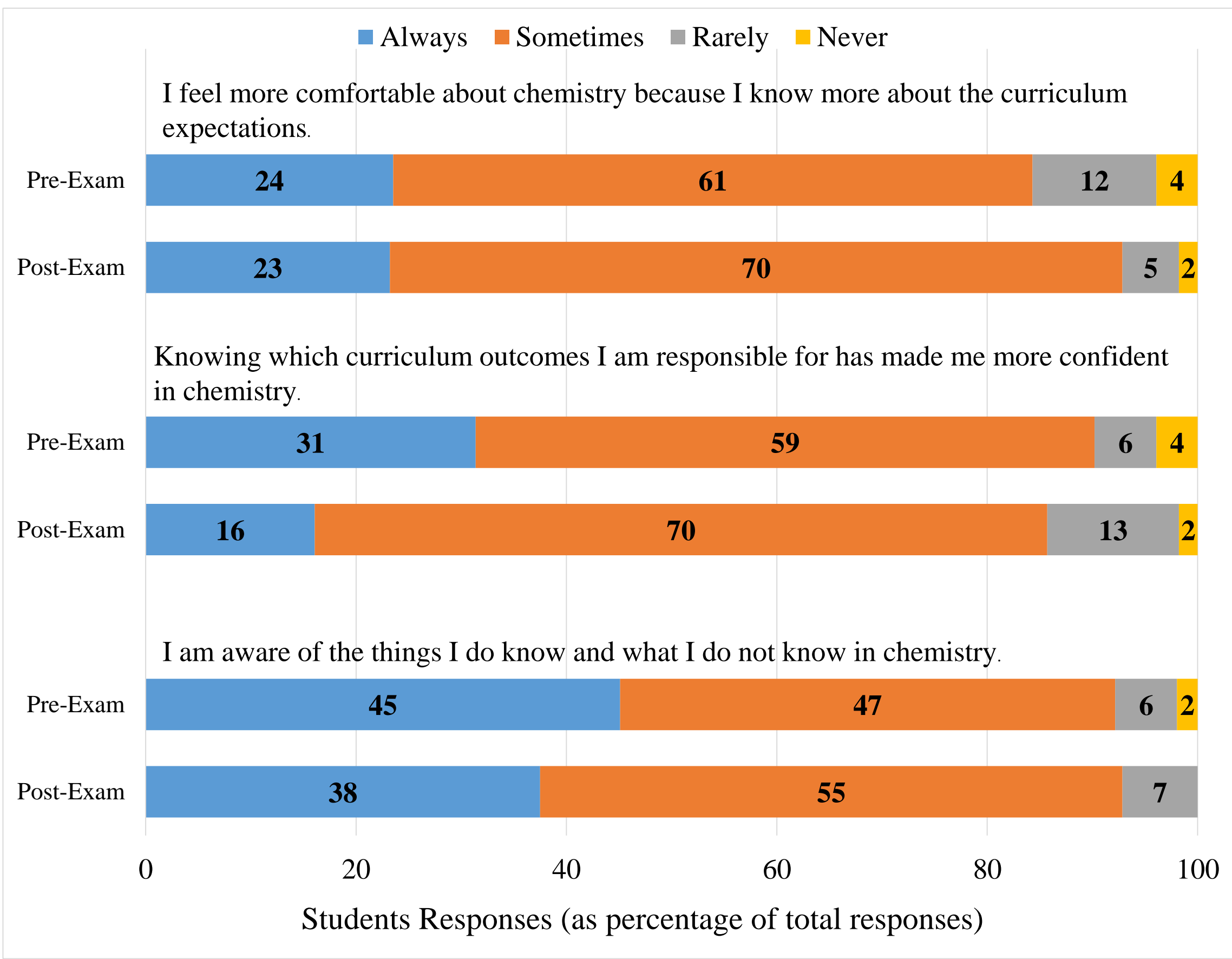


Figure 2. Student responses to survey questions about confidence with the curriculum ( $N=51$ ).

## TEACHER COMMENT

*“Ensuring that students have their misconceptions explicitly pointed out to them is key if student achievement is to improve. Guided reflections can help do this with the added benefit of helping students learn how to regulate their own learning.”*



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