Mastery Learning in High School Academic Physical Science

By Amanda C. Stone

**Observations**
- Spring academic physical science is physics. Skills build off of learned foundational skills.
- Some students were ready to move on, but others had not mastered foundational skills.
- Needed to individualize practice based on the level the students were at to help them reach learning goals.

**My Research Population**
- Size: 60 pupils (freshmen, one sophomore, one senior)
- Brecksville-Broadview Heights High School
  - 1,460 total enrollment
  - 11% economically disadvantaged

**Background**

**Interactions**
- Two rotating treatment and non-treatment units

**Treatment Units**
- Pupils worked through learning targets at own pace following order of activities outlined on mastery grids
- Mastery of each objective was defined as >80% on the checkpoint quiz. Remediation resources prepared for students scoring below mastery.

**Literature**
- Tiering in 9th grade general science: learners with least background knowledge had most academic growth (Richards & Omdal, 2007)
- Self-pacing in Calculus I university course: increased overall learning, engagement, and motivation (Konstantinou-Katzi, Tsolaki, Meletiou-Mavrotheris & Koutselini, 2013)
- 108 studies of mastery learning: Kulik, Kulik and Bangert-Drowns found medium to large gains in student achievement (as cited in Ostrowski, 2015)

**Research Questions**

**Focus Question**
What is the effect of the interventions on student achievement?

**Sub-Questions**
1. What is the effect of the interventions on student engagement?
2. What is the effect of the interventions on student self-efficacy?

**Student Achievement in Non-Treatment and Treatment Units**

**References**

**Conclusions**
- Medium to large learning gains were reported using the mastery learning interventions.
- Survey data indicated that student engagement decreased over time, while self-efficacy increased.
- Of the random student interviews, 75% liked the organization and structure of the mastery grid.

**Implications for Further Research**
- Testing the method at the beginning of the school year.
- Adjusting the incorporation of hands-on activities in the mastery learning format.
- Using the strategy for a few select concepts as opposed to a full unit.

Research conducted in Broadview Heights, Ohio from January 2017 to May 2017