Introduction

Learning-by-Teaching

• There is much inconsistency in teachers’ roles in learning-by-teaching research.
• Meta-analytic evidence has shown that tutoring is an effective learning activity (Cohen, Kulik, & Kulik, 1982). However, little research has examined learning-by-teaching outside of tutoring. Tutors typically have more prior knowledge and also may learn more from interactions with tutees.
• Bargh and Schul (1980) were the first to define 3 different stages of the learning-by-teaching process, as summarized in Figure 1.
• Some research has found that simply preparing to teach can produce advantages to taking a test (Benware & Deci, 1984; Fiorella & Mayer, 2013; Nestjø et al., 2014). Research has therefore noted a need to further examine the cognitive processes that are occurring while preparing to teach.

Hypotheses

The proposed study will incorporate concept maps into learning-by-teaching experimentation to determine the cognitive organization that is occurring while preparing to teach, as well as to increase the effectiveness of teaching by enabling teachers to engage in deeper processing through mapping.

H1: There will be a main effect of teaching on learning and retention scores.
H2: There will be a main effect of concept mapping on learning and retention scores.
H3: Those who teach will show more accurate and complete concept maps than those who do not teach.
H4: The main effect of teaching on learning will depend on the effect of concept mapping, such that the effect is stronger when a concept map is used and weaker when a concept map is not used.

Materials & Measures

• Expository text about the Doppler Effect of about 600 words with pictures
• Multiple-choice questions assessing the content in the text

Participants will receive an incomplete concept map with blanks based on research showing incomplete maps are better for beginners (Chang et al. 2002; Katelyama & Robinson, 2000).

Participants’ reading ACT scores – measure of verbal ability

Analysis Plan

A 2x2 ANCOVA will be utilized with teaching condition (teaching or no teaching) and concept mapping (mapping or no mapping) as between-subjects factors.

Participants’ reading ACT scores will serve as a covariate based on past research (e.g., Haugwitz, Nesbit, & Sandmann, 2010; Liu, Chen, & Chang, 2010; Stensvold & Wilson, 1990) finding concept maps more beneficial for students with lower verbal ability.

Pre-comprehension test scores will also serve as a control.

Means between the three comprehension tests will be compared to determine changes over time.