

Critical Fail: The Effects of Error Management Training on Critical Thinking

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Previous Work

- Keith & Frese (2008): argue that error management training is beneficial for improving posttest performance
- Joung, Hesketh, & Neal (2006): found that participants learned more from narratives that included mistakes that others had made more than participants that had no mistakes in their narratives
- Lorenzet, Salas, & Tannenbaum (2005): found that guided error training facilitated better learning than error free training
- The combination of all three of the previous research articles have led us to believe that an active error exposure training condition will improve learning acquisition and subsequently test performance compared to alternative training methods

Hypotheses

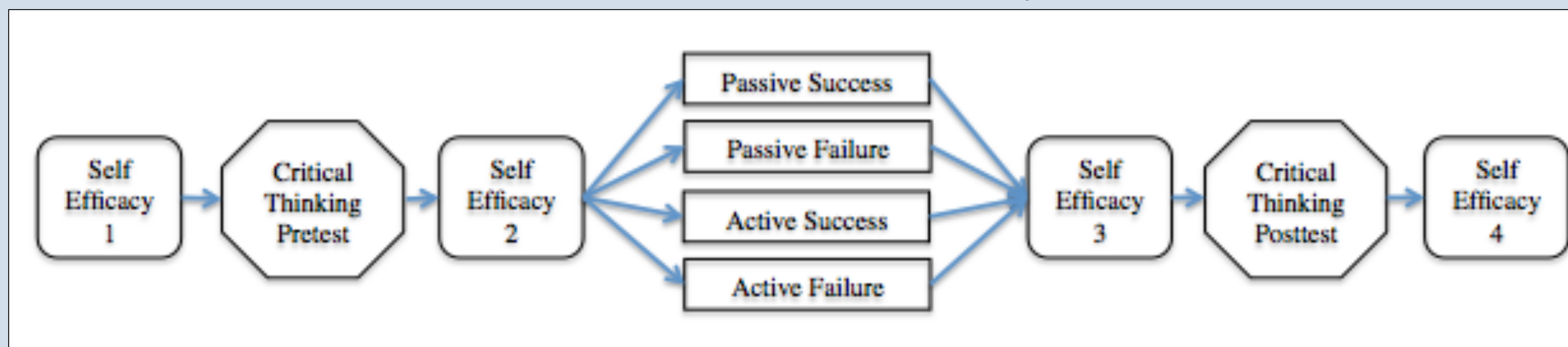
1. Error oriented training will be more effective than success oriented training.
2. Training which involves active engagement will be more effective than passive engagement training.
3. Participants who score higher on conscientiousness will get more out of the vignette condition than those who score lower on conscientiousness.
4. A) Participants with high stress reactivity will perform best when critical thinking seems easiest (passive success).
B) Participants with low stress reactivity will perform best when critical thinking seems hardest (active error).
5. A) Self efficacy will be highest after the passive success training.
B) Self efficacy will be lowest after the active error training.

Methods, Materials, and Training Conditions

19 students from Sewanee were recruited and given an online survey using Qualtrics: 11 males and 8 females, with a mean age of 20.7.

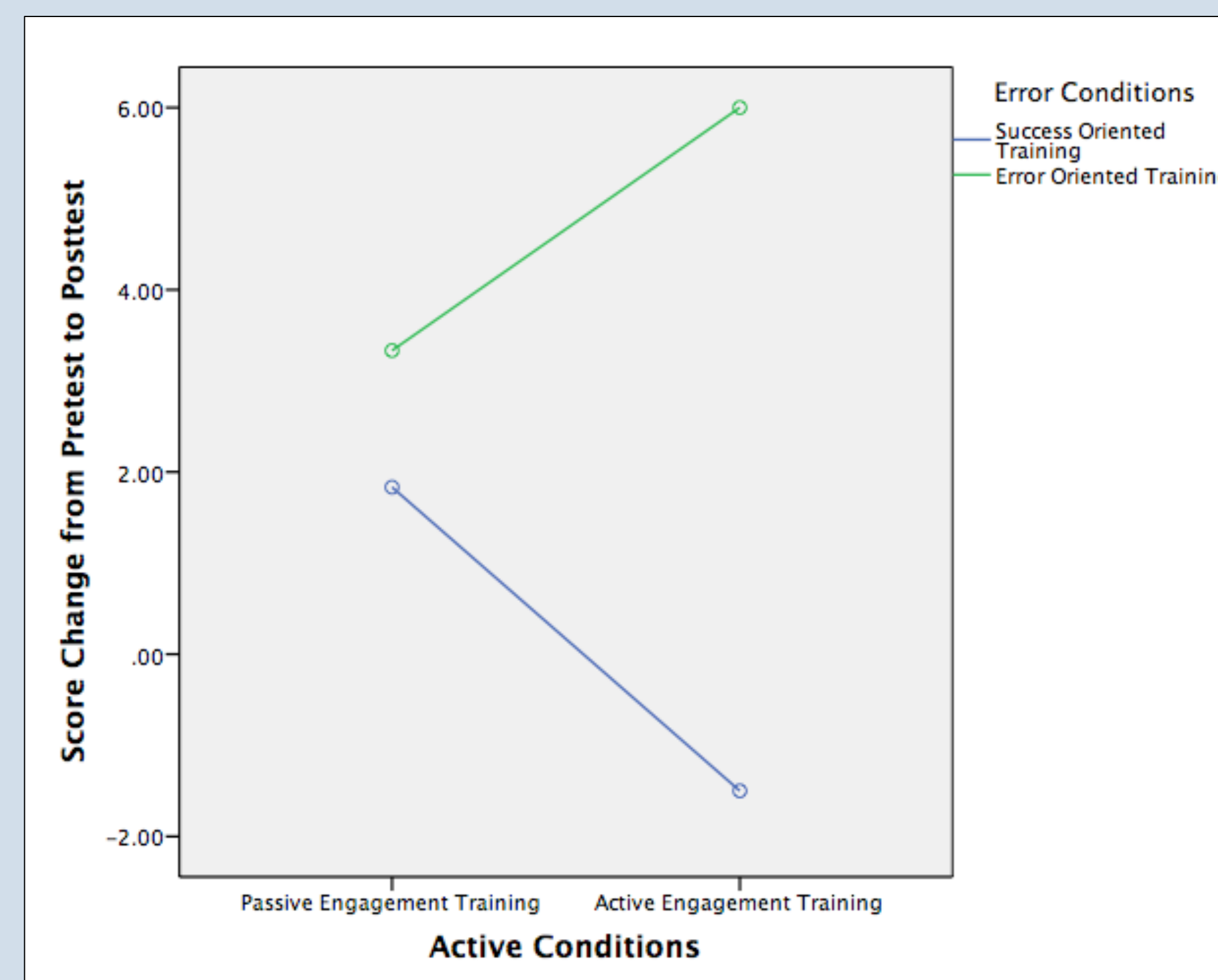
Participants took a critical thinking pretest, one out of the four training conditions, and then took a critical thinking posttest. Self efficacy was measured at four time intervals: before the pretest, before and after the training, and after the posttest. Passive training condition participants read a vignette about two characters successfully or unsuccessfully evaluating an argument. Participants in the active conditions wrote two statements that were either consistent or inconsistent with the same premise as used in the vignettes. To measure individual differences within our sample, participants took a Conscientiousness Survey, the Perceived Stress Reactivity Scale, and a demographic questionnaire.

The Structure of our Study



Results

- Success vs error training mattered ($t(13) = -3.192, p < .01$) Those in the error oriented conditions ($m=4.857$) improved their critical thinking significantly more than those in the success oriented conditions ($m=1.000$).
- Active vs passive training did not matter
- There was an interaction ($F(1) = 7.543, p < .05$) between success vs error and active vs passive as displayed in the figure to the right
- For those in the passive training conditions, no significant correlation was found between conscientiousness and critical thinking improvement
- Stress reactivity did not have a main effect on critical thinking improvement nor did it interact with the type of training participants received.
- Self efficacy did not change consistently across the study nor were different patterns identifiable for the different conditions. However, there was a trend for active error condition participants to initially express doubt in their ability to critically think but then feel more confident as time continued, a trend which was also found by Joung, Hesketh, and Neal (2006).



Discussion

- Incorporating errors into the learning process can be beneficial for increasing performance in those skills
- The interaction between active learning and error oriented learning suggests that actively incorporating errors into the learning process can increase learning
- The poor performance of those in the active success condition was surprising. This may have been related to the fact that the critical thinking questions asked them to find errors, the exact opposite sort of behavior as their training
- Although our study did not find significant differences for the effect of individual differences on error training, further research is still warranted
- This current study was limited in the number of participants, again highlighting that further research needs to be done on this topic
- This study is a promising first step in applying error management training to developing critical thinking

Acknowledgements

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