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# Examining Elementary Pre-service Teachers' Critical Thinking Ability through Inquiry-based Learning Design Imbedded in STEM Lessons

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### Abstract

The purpose of the study is to examine enhancements in the critical thinking of pre-service K-6 teacher candidates. Enhancements were imbedded in an elementary-level teaching training course, delivered to 21 pre-service educators. I primarily intend to explore the critical thinking of these educators as they implemented in vivo STEM lessons. Candidates who registered for the training course in spring 2023 served as study participants. I administered two surveys (pre and post) to explore candidates' abilities to critically think about lesson design.

I administrated the "pre" survey at the end of first 8-weeks of the course, with the "post" instrument delivered at the end of second 8-weeks. The two surveys included five-level Likert (agree-disagree) items dealing with critical thinking. In addition, I included two open-ended questions designed to seek direct evidence of critical thinking about lesson design via matched-sample t-tests. I compared pre- and post- assessment items. I also employed content analysis in an examination of the open-ended items.

Results demonstrated that pre-service teachers experience difficulties "moving" from deductive reasoning (e.g., traditional Direct Instruction model probably learned via their school experiences) to inductive reasoning (e.g., inquiry-based model) in applying critical thinking to lesson design (at pre-assessment). After the course, they particularly endorsed meaning to critical thinking about lesson design, especially as implemented in STEM lessons. Teacher preparation staffers may need to enhance the teaching of critical thinking skills for candidates and suggest ways to help them pass along these skills to their own students.

**Keywords:** critical thinking, inductive reasoning, STEM lessons, elementary pre-service teacher, teacher preparation program