



TPC 0554594

Impact of Reformed Courses on the Science Teaching Self-Efficacy Beliefs of Preservice and Inservice Elementary Teachers

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Background: Science Teaching Efficacy Beliefs

- ❖ Construct and measurement developed by Riggs & Enochs (1990)
- ❖ Based on:
 - *Efficacy Beliefs* (Bandura, 1977; 1986)
 - *Teaching Efficacy Beliefs* (Gibson & Dembo, 1984)
- ❖ Has two components:
 - *Personal Science Teaching Efficacy* (PSTE)
 - The level of confidence an individual has in his or her ability to teach science
 - *Science Teaching Outcome Expectancy* (STOE)
 - The extent to which an individual believes that students can learn science if it is taught effectively

Q1 Results: To what extent did reform courses influence teachers' self-efficacy?

- ❖ Self-efficacy scores (measured by the STEBI) were slightly lower, but not significantly different for teachers who took a reform course ($n = 35$) compared to those who didn't ($n = 31$)

	STEBI	PSTE	STOE
Reform	$M = 72.34$ $SD = 20.13$	$M = 36.20$ $SD = 14.42$	$M = 36.14$ $SD = 7.39$
Comparison	$M = 79.52$ $SD = 21.16$	$M = 42.97$ $SD = 13.62$	$M = 36.55$ $SD = 8.82$

Q1 Results: To what extent did reform courses influence teachers' self-efficacy?

- ❖ Undergraduate focus groups ($n = 38$) reported that they gained more confidence in their ability to teach science from:
 - Experiences that sparked interest in the content and/or made them enjoy learning about the content (71.0%)
 - A greater number of courses in a particular content area (55.3%)
 - Courses that explicitly connected the content to how to teach it and/or gave students the opportunity to teach the content to children or to each other (47.4%)
- ❖ For 23.7% of focus groups, students expressed that some of their undergraduate courses in which they had very positive experiences actually made them feel less confident by making them realize how much they did not know about teaching science

Reasons for inservice teachers' confidence to teach particular science content

Reason	% Teachers	Example(s)
Amount of knowledge regarding the content	54.5	I have a degree in biology with a minor in physics so I feel pretty secure in my ability to teach all science content areas.
Personal interest in the content	41.6	I feel most confident teaching biology because it's my passion. I feel least confident with physical science because I just never liked it.
Amount of experience teaching the content	40.3	I guess [science] is a little intimidating. Not like with reading or something I've taught more.
Judgment of content as "basic" or "complicated"	24.7	I don't feel comfortable teaching physics because it's just so complicated.
Grade level teaching	20.8	At least at the third grade level, I think I'm pretty comfortable. I think I understand everything a third grader would know.

Q2 Results: To what extent do self-efficacy beliefs relate to teachers' classroom practices?

- ❖ There was no correlation between PSTE or STOE scores and RTOP scores
 - Inservice elementary teachers with high efficacy were just as likely to be observed teaching in a reformed manner as teachers with low efficacy
- ❖ Lack of correlation remained even when taking into account: gender, grade level, total years teaching experience, years experience teaching at current grade, number of science content courses, and extent of professional development

Q2 Results: To what extent do self-efficacy beliefs relate to teachers' classroom practices?

- ❖ Case profiles of 8 inservice teachers with varying STEBI and RTOP scores were examined in greater detail to examine some of the complexities between self-efficacy beliefs and observed science teaching practices.
- ❖ Results suggest that a mismatch between self-efficacy and reformed teaching practices may be due to differing beliefs about what it means to teach science in an “effective” manner including beliefs about:
 - “Hands-on”
 - Classroom Control
 - Provided curricular resources (e.g. SMART boards & kits)

Summary

- ❖ There was no difference in quantitative self-efficacy (STEBI) scores between those inservice elementary teachers who did and did not take the reform courses.
- ❖ However, qualitative data does suggest that certain components of reformed undergraduate courses did impact the self-efficacy of preservice and inservice elementary teachers.
- ❖ Additional analysis indicate that the relationship between self-efficacy and science teaching practices are complex.