Pre-Service Teacher Attitudes towards Science

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BACKGROUND

Let's Talk Science is a national non-profit organization dedicated to making science accessible to elementary and high school students by establishing partnerships between university graduate students, pre-service teachers and elementary and high school students. Let's Talk Science strives to improve Science literacy through leadership, innovative educational programs, research and advocacy.

INTRODUCTION and PURPOSE

• Science is sometimes avoided in the elementary school classroom. This phenomenon is often due to a lack of teacher confidence or self-efficacy towards the subject (Howitt, 2006)
• According to Bandura (1986), self-efficacy can be defined as "... beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3).
• It has been shown that pre-service elementary teachers often lack content knowledge (Skamp, 1989), that they consider themselves 'non-science' people (Mulholland & Wallace, 2002), and that they tend to have attitudes and beliefs towards science that limit their ability to be effective science teachers (Watters & Ginns, 2000).

Purpose

The purpose of this study was to assess the attitudes of pre-service teachers towards science teaching before and after teaching a series of hands-on, innovative science outreach activities. This project had the potential to enhance the comfort level and confidence of participants who teach science in their B. Ed. practica. Results from this study are being used to direct further partnerships between LTS and the Faculty of Education at Queen's University.

Research Questions

1) What attitudes towards science teaching exist in pre-service teachers prior to involvement with Let's Talk Science?
2) How, if at all, did the pre-service teachers' attitudes towards teaching science change after participation in the Let's Talk Science program?
3) How can the partnership between Let's Talk Science and a Faculty of Education be augmented to help better prepare pre-service teachers to teach science?

METHOD

This mixed-methods study consisted of two sections, a survey and follow-up interviews.

Survey

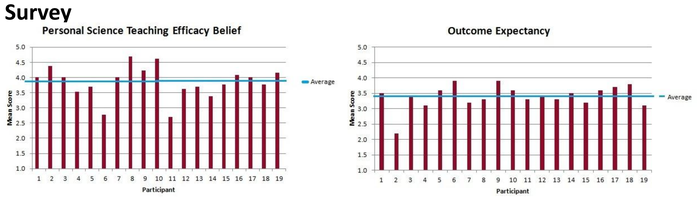
- Used to identify the range of beliefs about self-efficacy and science instruction that existed in B. Ed. Candidates at Queen's University.
- STEBI-B survey instrument (Enochs & Riggs, 1990)
- Consists of 23 Likert-style statements and measures the *personal science teaching efficacy* and *outcome expectancy* of participants.
- 19 B.Ed. Candidates completed the online survey.

Interviews

- Conducted with those who had the opportunity to lead hands-on science activities through the LTS program.
- Semi-structured interviews were conducted with three B. Ed. Candidates
- Intended to deepen the understanding of the impacts of the LTS program on the B. Ed. volunteers, and to gain a sense of how the partnership between LTS and the B. Ed. Program could be strengthened for years to come.

FINDINGS

Survey



- The graph titled *Personal Science Teaching Efficacy Belief* displays the mean score that each participant received regarding her perceived ability to teach science.
- The graph titled *Outcome Expectancy* displays the mean score that each participant received regarding his beliefs about why a student will succeed in science education.

Interviews

Several themes emerged during the interviews, including: differentiated learning, collaboration and team-teaching, and hands-on instruction.

"I was nervous… Sometimes I didn't really understand the science, so for grade eight chemistry and stuff like that, I was nervous that the kids would ask a question and I wouldn't be able to answer." (Participant B)

"I am comfortable teaching biology, but less so teaching chemistry , physics, and even environmental science. Being paired with someone who knew about those subjects made me more confident. " (Participant A)

"I really learned about the different needs at different schools. Because we were visiting so many schools, working with LTS showed me that what was too advanced at one school may not be enough at another school. I really learned about differentiated instruction, about gearing my teaching to the needs of students" (Participant C)

"[working with LTS] was good practice. You kind of learn that you don't need to have all of the answers, and that it can even be a good thing. If I have questions as well, it just shows the kids that I don't know everything, and that's what science is about; asking questions and figuring stuff out." (Participant B)

"I think it's really great for teacher candidates, because it gets you experience with different schools, different classrooms, different teaching styles, and different grades." (Participant B)

"I think having a science student go [to the classroom] would be good because they have the science knowledge, but I think we [teacher candidates] know how to run a classroom, how to ask the right questions to get students thinking… It would be very interesting if we were paired up" (Participant B)

"It was worthwhile. I enjoyed the opportunity to work with P/J classes. It provided me with the opportunity to branch out to different subjects and age groups" (Participant A)

DISCUSSION

- The survey was completed by pre-service teachers who were near the completion of their B. Ed. degrees; the expectation was therefore that they should be confident about their abilities to teach science. However, the results of the survey show that there is still room for improvement.

- Interview participants noted that prior to the LTS partnership, they were nervous about teaching science in their future classrooms. While some of those interviewed specialized in one curriculum area (i.e. biology) but had little experience in others, other participants had received little to no opportunity to teach science in their previous practica.
- One of the major benefits of the partnership, therefore, was that the pre-service teachers involved were exposed to science teaching, both in subjects and at grades, that they otherwise would not have experienced.
- Participants were clear that this exposure helped them to gain confidence, both in their scientific knowledge and their ability to teach science effectively.
- One advantage of the LTS program that was identified by the pre-service teachers who were interviewed was that they were able to team-teach with a peer to facilitate the hands-on lessons.
- Team-teaching includes activities such as "cooperative planning, instruction and evaluation of learning experiences" (Sandholtz, 2000, p. 40). It has been suggested that team-teaching is a possible means of dealing with the low self-efficacy often felt by pre- and in-service teachers alike, and is seen as a way of aiding professional development and improvement of practice (Lieberman, Saxl & Miles, 1988; Sykes, 1996).
- In fact, a further suggestion that came from the interviewees was that in the future iterations of this partnership, pre-service teachers be paired with science experts (i.e. graduate students from science faculties). This could provide the combination of science knowledge and classroom management and pedagogy knowledge needed to make the LTS program even more successful.

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