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Research Experiences for Teachers: Sustained Influences to Practice, Career, and Retention

Abstract

This study investigated changes to previous participants of a professional development program such as changes to classroom practices and teacher retention due to program participation.

Focus

This study is a pilot to a larger study to investigate sustainable changes to participating science teachers' classroom practices, retention in the field, professional opportunities, and leadership roles resulting after participation in a Research Experiences for Teachers (RET) program. This study focused on a group of RET participants who attended the program at the National High Magnetic Field Laboratory (Magnet Lab) through Florida State University. Participants took part in the RET program between one and seven years ago.

Since 1999, the Magnet Lab RET program has provided professional development for 131 teachers. Past studies have been conducted on RET programs and suggest there could be positive and sustainable changes to RET participants' science teaching attributed to immersion-type of professional development programs such as RET (Dixon & Wilke, 2007). This study investigated how the RET program at the Magnet Lab influenced K-12 science teacher retention, professional opportunities within and outside the science education arena, and science teaching practices. The larger, continuing study will investigate RET program features from several RET programs, that may or may not contribute to how K-12 science teachers think and plan for instruction.

The National Science Foundation has supported RET programs for decades and anecdotal evidence abounds that the programs are successful. Past studies have researched the changes to RET participants immediately after their attendance in the program (Dixon & Wilke, 2007). However, research suggests it may take years for teachers to make significant changes to their teaching practices (Fullan, 1999; Guskey, 1986). There is some evidence that an effective professional development experience may help improve the quality of teaching as well as student achievement (Seymour, Hunger, Laursen, & Deantoni, 2003). There is little research that has determined any sustainable differences to participants' science instruction or other teaching characteristics years after participating.

Research Question: How does an RET program influence participants long after the teacher leaves the program?

Theoretical Framework

The pilot study was conducted to validate a survey designed to inform the research questions. Face validity was accomplished through focus groups conducted after teachers completed the survey.

An ongoing objective of most professional development programs is to provide experiences that create change in classrooms and support standards-based inquiry classrooms (Loucks-Horsley, Love, Stiles, Mundry, Hewson, 2003). Research suggests that an effective experience may help improve the quality of teaching as well as student achievement (Seymour, et al., 2003). Previous qualitative studies have examined one professional development program and how this experience affects teachers' thoughts about planning and science teaching practices specific to the elements focused on during the program (Dixon & Wilke, 2007; Grove & Dixon, 2007). The RET program supported 10-18 K-12 science teachers every summer. Participants were selected from across the nation to spend six weeks with a mentor scientist in a nationally recognized science laboratory. The RET program features are specifically designed to encourage reflective planning based on teachers' understanding of inquiry, experimental design, the nature of science, process skills and communication.

More than just workshop style tricks of the trade, effective professional development needs to include meaningful trainings that impact teachers' perspectives and understanding of science (Dana, Campbell, & Lunetta, 1997). Teacher enhancement programs that go beyond the typical 1-3 day workshop provide experiences that can support standards-based inquiry classrooms and help improve the quality of teaching (Loucks-Horsley, et al, 2003; Seymour, et al, 2003). This study investigated how the RET program produces sustainable changes to teachers' science teaching practices.

Research on a similar type of program, Research Experiences for Undergraduates (REU), is based on a situated cognition in learning (Kardash, 2000). The RET program uses the effectiveness demonstrated for the REU programs and substitutes science teachers for undergraduate science students as part of this process. Other immersion type of professional development programs also exist (i.e. Columbia University RET), however no previous study has investigated long-term influences of immersion experiences on participants.

Research suggests that teachers often make slow and subtle changes to their classroom practices (Desimone, Porter, Garet, Suk Yoon, Birman, 2002; Fullan 1993). If the RET program is effective, participants may make continuing changes to science teaching practices long after the program has ended. Other changes such as taking on leadership positions and professional opportunities may also arise after teachers participate in an RET program. This study is investigating how these changes may appear even years after attendance to the program.

Expectancy-value theory is a motivational theory developed by Wigfield and Eccles (2000). The theory states that intrinsic motivation is affected by teachers' beliefs about choice, expectancy and value. As professional development programs take teachers and guide them through new learning, it appears appropriate to use learning motivational theories for "teachers as learners" (Loucks-Horsely, et al, 2003). Expectancy-value theory has been used to frame a previous RET study (Grove & Dixon, 2007) and is anticipated as the theoretical framework for the larger study that will include qualitative data.

Methods

Participants for Pilot Study

Participants for the pilot study were past participants of the 1999-2006 RET program at the National High Magnetic Field Laboratory (Magnet Lab) in Tallahassee, Florida. Since 1999 this RET program has served 115 science teachers. The seven pilot study participants were closely accessible to the Magnet Lab and to the researcher. The study demonstrates how the RET program can influence participants after a long period of time.

Procedure

Past RET participants were contacted and asked to complete consent forms along with an initial survey. The initial survey included information concerning demographic data, teaching experience, degrees earned, changes to practice due to RET experience, and other related questions.

Quantitative comparisons and descriptive statistics were used to identify differences among previous RET participants and their retention as an educator, additional degrees/certifications, or other professional opportunities as a result of attending RET. Qualitative themes were coded from open ended response items on the initial surveys to the pilot study participants. A focus group was held to assist in the face validity of the survey to be used to extend this research study to all 115 past participants of the RET program and then to three other RET programs around the country.

Results

Results from the surveys collected on seven past RET participants revealed that while two participants had their Master's Degree before attending RET, two other past participants were now seeking advanced degrees. While three of the participants are now in leadership education programs, they are still in education-related positions. Three other participants are still teaching in their local high schools, and are conducting workshops for other science teachers in the area.

Survey results also indicated that six out of the seven participants now attend more professional development than they did before attending RET. The seventh participant

indicated that she attends the same amount of professional development as she did before her experience at RET.

Initial surveys questions asked participants to reflect on why they attended RET and if they made any changes to teaching practices after attending RET. The mean for making changes such as changes to procedures in the classroom, conducting more experiments, and having a more student-centered class was a “3” indicating “mostly” for the seven participants.

Responses to questions concerning participants’ feelings of positive and negative emotions before and after attending RET indicated although most of the participants felt anxious before the program, very few felt any anxiety at the end of RET. Also, responses indicated the participants rated their feelings of confidence pre RET with a mean of 2.71, compared to post RET with a mean of 4.00.

Findings

Findings suggest past participants of an RET program are more likely to increase their participation in professional development programs after attending an RET program. Also, more positive emotions, including confidence increase after attending an RET program. Positive changes to classroom practices were also shown to be increased due to participation in an RET program.

These findings are a result of a very small sample size. However, these positive preliminary results suggest further study into past participants of RET programs may produce results indicating changes to practice, teacher retention, and professional opportunities, largely due to the participation in an RET program.

Relevance to Science Education and ASTE Members

Professional development programs attempt to provide new ideas and innovative techniques for teachers. These programs intend to create more effective teachers and, by extension, to improve student achievement and understanding. Past studies of RET programs suggest program features may impact teachers’ planning and reflection of science teaching. However, would more changes and influences be found if a study followed up on any sustainable changes to participants of RET programs? This question guided the pilot study and is the basis for the planned larger study to determine any sustainable influences to RET participants over time.

ASTE members will be interested in the findings concerning how immersion types of professional development experiences, like RET programs influence teachers over time. Although this pilot study focused on a few past RET participants, further research could be done on other RET professional development programs to investigate long term influences on past participants.

References

- Dana, T. M., Campbell, and Lunetta, V. N. (1997). Theoretical bases for reform of science teacher education. *The Elementary School Journal*, 97 (4), 419-432.
- Desimone, L. M., Porter, A. C., Garet, M. S., Suk Yoon, K., Birman, B. F. (2002). Effects of professional development on teachers' instruction: results from a three-year longitudinal study. *Educational Evaluation and Policy Analysis*, 24 (2), 81-112.
- Dixon, P. & Wilke, R. A. (2007). The influence of a teacher research experience on elementary teachers' thinking and instruction. *Journal of Elementary Science Education*, 19 (1), 25-43.
- Fullan, M. (1993). *Change Forces: Probing the depths of educational reform*. Levittown, PA: The Falmer Press.
- Grove, C. M. & Dixon, P. J., (2007 April) *Research Experiences for Teachers: Influences Related to Expectancy and Value of Changes to Practice*. Paper presented at the National Association of Research in Science Education, New Orleans, LA.
- Guskey, T. R. (1986). Staff development and the process of teacher change. *Educational Researcher*, 15 (5), 5-12.
- Kardash, C. M. (2000). Evaluation of an undergraduate research experience: perceptions of undergraduate interns and their faculty mentors. *Journal of Educational Psychology*, 92 (1), 191-201.
- Loucks-Horsely, S., Love, N., Stiles, K., Mundry, S., & Hewson, P. W. (2003). *Designing Professional Development for Teacher of Science and Mathematics*, 2nd edition. Thousand Oaks, CA: Corwin Press, Inc.
- Seymour, E., Hunter, A. B., Laursen, S. L., Deantoni, T. (2003). Establishing benefits of research experiences for undergraduates in the sciences: first findings from a three-year study. *Wiley Interscience*, www.interscience.wiley.com.
- Wigfield, A. & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology*, 25, 68-81.