Understanding the Role of Professional Development on Educators' Science Teaching

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Abstract

To better understand the influence of professional development programs on science teachers, we chose to conduct a literature review of current programs and their influences on participating teachers and their students if applicable. For this study, we define professional development programs as Undergraduate Research Experiences(URE), Teacher Professional Development(PD), and/or Research Experience for Teachers(RET).
Our research questions that drove our choice of articles were: What is our current understanding of science professional development for science teachers and their students?
Are there differences in the impact for elementary, middle, and/or high school teachers?
Are there differences in impact by the teacher and student demographics?
Are there differences in the impact based on the type of professional development (RETs, UREs)?
To address these questions, we analyzed peer-reviewed literature.

Introduction

Science teachers engage in professional development to enhance their skills as educators translating the content and processes of science to their students. Since this is the case, a better understanding of the benefits of professional development (PD) is needed to better equip teachers for teaching future generations.

Despite the lack of research into these areas, there is still some data showing that research apprenticeships make a positive difference in keeping underrepresented science students on the pathway to a scientific career but participating in the program alone is not enough to influence persistence in STEM **(Hernandez et al., 2018)**. Participation in RET programs has been shown to positively influence teachers' thinking and practice, which in turn changes how they will change their classroom practice and will reflect in their student's understanding of the stem-based topic **(Southerland et al., 2016).**

This raises the question guiding our research:

- **What is our current understanding of science professional development for classroom teachers and their students?**

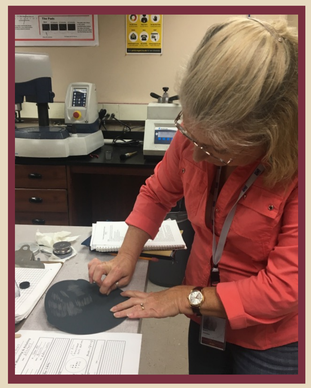
Methods

- Read and analyzed peer reviewed articles
- Analyzed articles based on the following criteria: research question(s), type of research method (qualitative, quantitative, mixed), program type (RET, URE, etc.), description of sample/participants, results in summary, conclusion, and further questions
- Discussed our analysis in biweekly zoom meetings
- Developed themes based on this analysis.

Future Directions

The results of our study has led to questions about future research:

- What are the long-term effects of RET programs on teachers and their students?
- What amount of intensity and duration would be most effective or impactful for participants?



Findings

- RETs include **elementary teachers**, K-5 teachers can benefit from participation in scientific research.
- Understanding the **emotions** in science is a crucial component to exploring the epistemic effect in elementary teachers' research experiences.
- RETs can show teachers how **scientific research looks different** from traditional views of science teaching in classrooms.
- RETs, teachers will have a better experience of **scientific inquiry** if they receive positive mentoring relationships during their program.
- Teachers who engaged in PD that were **'research oriented'** often expressed a desire to change their teaching practice, but the degree to which these changes were observable was often mixed.
- **Longer research sessions** allows teachers to feel more comfortable by developing specific skills-based research and leads to a higher chance of success when teaching their students about STEM.

References

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Southerland, S. A., Granger, E. M., Hughes, R., Enderle, P., Ke, F., Roseler, K., ... & Tekkumru-Kisa, M. (2016). Essential aspects of science teacher professional development: Making research participation instructionally effective. AERA Open, 2(4), 1–16. https://doi.org/10.1177/2332858416674200

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