Introduction
BioEYES, a classroom-based outreach program, has been partnering with high-need school districts across the U.S. since 2002. Students use live zebrafish and optically clear zebrafish larvae in their classrooms in order to become scientists by performing a week-long experiment. On day one, groups of 3–4 students set up mini fish tanks to produce offspring. Students then observe zebrafish behavior, embryo and larvae development under microscopes, and use the scientific method to answer grade-appropriate questions in their scientific journals. All of this is free to public schools. BioEYES is also an innovative teacher professional development program, which first utilizes training and co-teaching with university educators that then supports a model teacher (MT) program. This effort is focused on building a network of teachers who autonomously deliver the program.

In spring 2016, BioEYES will reach 100,000 students in partnership with 1,300 teachers.

Methods & Results
Similarities in Student Content Knowledge Outcomes Between Model Teacher and Outreach Educator Cohorts

Survey Outcomes
- Teachers stated that teaching practices learned from BioEYES have helped them integrate inquiry-based teaching long-term in their classrooms (93%).
- Collaborative Inquiry and Collaborative Discourse ranked as the highest teaching practices, which according to teachers, BioEYES had helped improve in their classrooms (53.3%).
- Mimicking science practices through hands-on activities & science experiments were ranked as the second highest teaching practice (43%).

Teacher Attributes
Self-Report of BioEYES impact on teaching traits

Independent t-tests were conducted to analyze elementary student learning gains of pre and post student assessments. Data is based on completion of pre/post surveys and not total program participation. MT survey data was collected (n=15) in January 2016.

Project Aim
The study was aimed at evaluating the BioEYES MT program, in the context of its effectiveness to promote program expansion, and as a framework for formal-informal collaboration through teacher professional development.

Research Questions
1. What are the economic cost/benefits of the BioEYES MT program?
2. Is there a difference in learning for students in MT classrooms vs. those co-taught with outreach educators?
3. What are MTs’ perceived long-term impacts on science teachers’ teaching practices and traits, outside the BioEYES program?

Results Cont.

Economic Impact
The two-year financial investment in training and co-teaching with teachers decreases by ~50% after the teachers “graduate” to MT status. BioEYES educators are hired for either 9 or 12 months/year even though the number of weeks in the academic year available for teaching and outreach is often limited, thus the cost of the program has to absorb these “unused” weeks. BioEYES supplies content to several grade levels and teacher teams within schools. This allows BioEYES to develop MTs who cover numerous curriculum objectives across multiple grade levels, and frees BioEYES staff to work in new schools. This PD model assists in keeping a modest program budget, realistic program goals and securing long-term partnerships with teachers.

Student Learning
At the elementary level, we found that students taught by MTs started with a higher knowledge base than classrooms that included an OE. Yet, post results were comparable between the MT and OE classrooms. Regardless of who taught BioEYES, significant content knowledge gains were seen, indicating that MTs and OEs are similarly effective, and that MTs are implementing BioEYES with fidelity. Seeing student content knowledge increase strengthens the PD model’s impact on training teachers to autonomously deliver the BioEYES curriculum to the same caliber as if an outreach educator was present.

Conclusions

Long-term Teacher Impact
Although BioEYES provides an annual one-week curriculum, MTs reported their long-term experience with the program has had a lasting impact on their science teaching practices. Most notable is the shift in classroom instruction to include the engagement of students as scientists during inquiry-based lessons and their practices of collaborative group work and collaborative discourse. Eighty percent of MTs report that the BioEYES program has increased their confidence in allowing students to investigate and discover scientific phenomena, replacing teachers’ transfer of information directly to the student. This shift in pedagogical practice enables students to build workforce skills while tackling often complex scientific information.

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