Developing Leaders in Science Teaching Through a Transformative Induction Model

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Agenda

- Induction Model Description
- Findings and Conclusion
- Break out discussion on characteristics and transferability and scaling of a successful transformative induction model
- Summary of key factors related to using the transformative induction model

Background Info

- Key Question:
  - *How do professional learning communities, utilized as a transformative induction model, support reformed teaching performance?*

- Definition of Professional Learning Community (PLC):
  - PLCs provide teachers with a **larger community** (Gee, 2000), space to **reflect** on their teaching practices, and provide teachers with **support**, voice, and long-term **mentorship** relationships for retention in the field of education (Ingersoll, 2017).

- Definition of Reformed Teaching:
  - Reformed teaching focuses on **student-centered learning as opposed to traditional, teacher-centered delivery** (Piburn, Sawada, Falconer, Turley, Benford, & Bloom, 2000)

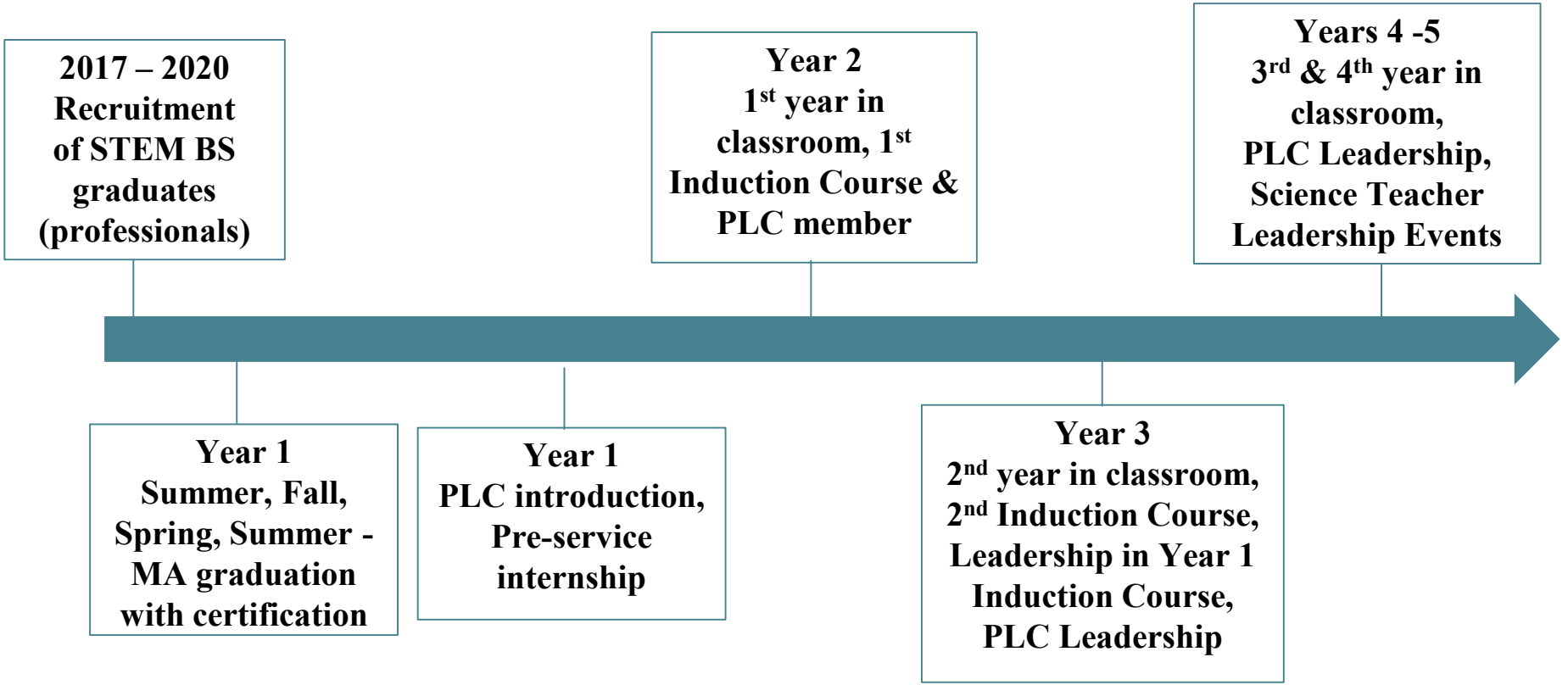
Developing Leaders in Science Teaching (LIST)

- National Science Foundation Grant, Noyce Teaching Fellowship Track 2 Project **recruiting Fellows from STEM** university graduates and professionals
- LIST is a scholarship and induction program designed to develop high quality biology, chemistry, and physics teachers with specialized skills in science **teacher leadership in high needs schools**.
- The program has the goal of transforming its Fellows from mentored teacher novices to science teacher leaders in the education community through **long term mentoring via PLCs.**
- This **transformative program model** is developed through a 3-way collaboration between new teachers, faculty and graduate students in the university, and teacher colleague professionals in schools.

*This material is based upon work supported by the National Science Foundation under Grant **#1660557**. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.*

Program Overview

The purpose of this study is to test a nontraditional model of professional collaboration, the professional learning community (PLC), within a preservice program and during an extended in-service teacher experience in high needs schools.



LIST Provides

PRESERVICE PREPARATION

- Fellows selected after earning BS in science
- $17,100 scholarship towards one-year advanced Masters degree which was CAEP accredited with 39 graduate credit hours
- Internship supervision/professional development using LIST personnel in high needs schools
- Continuous preservice professional learning community (PLC) activities
- Alabama Class A state teaching certification & edTPA portfolios
- Continuous value-added professional development seminars, workshop, and field trip activities

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LIST Provides

INSERVICE INDUCTION

- Ongoing virtual professional learning community (PLC) structure
- Induction included graduate course credit toward EdS degee and AA level certifcation
- $10,600 yearly supplemental stipend for 4 years after graduation
- Continuous mentoring over a five year period (preservice-inservice)
- Ongoing professional development seminar and workshop activities to build expertise for teaching in high needs schools
- Continuous development of professional leadership skills through practice and performance as science teacher leaders in local schools and with state, regional, and national conferences and agencies

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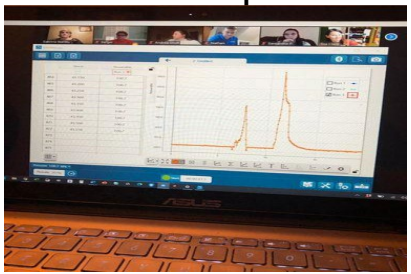
LIST Provides

- **Leadership seminars & workshop opportunities (some examples)**
  - Conferences
    - Presenters at state and regional science teacher conferences
    - Confernece attendence–NSTA, SENOYCE, ASTA, MSERA, NSF-Noyce, MWNOYCE
  - Graduate courses including Seminars (Webinars), Workshops, Classroom practice
    - Social & Emotional Learning (SEL) workshop
    - NSTA Learning Center resource training workshop
    - Topics focused on advanced science teaching and leadership skills
    - Lesson Study and Action Research seminars, workshops, and classroom practice
  - Field trips
    - Hudson Alpha Institute for Biotechnology
    - Birmingham Zoo Cross-Curricular Study of Water Pollution
  - Technology
    - PASCO sensor and equipment packages
    - Alabama state *Science in Motion* training, services, and equipment
    - Technology training in biology, chemistry, and physics applications and devices
    - Google classroom certification level #1 & #2 and NSTA Learning Center training
  - Mentorship
    - Guiding novice teachers
    - Co-teach induction courses and seminars (webinars)



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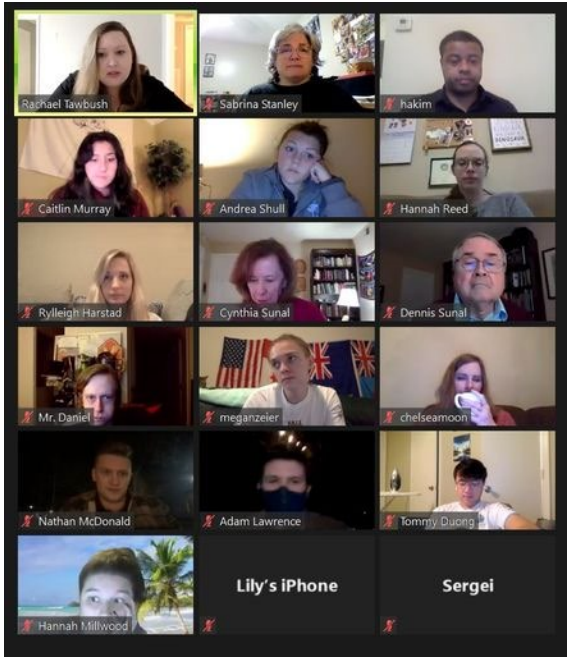
NSTA
lational Science Teachers Association


Harry Potter
Chemistry


ALPHA INSTITUTE FOR BIOTECHNOLOGY

LIST Provides

- **Cohort Cohesion**
  - Frequent Zoom meetings
    - Planning
    - Induction classes
    - Check-ins with cohort and whole group
    - Individual discussions for special help
  - Think tank Zoom sessions
    - Informal space for sharing ideas
    - Includes school colleagues
    - Special technology updates and skills
  - Group texts and communication
    - Check-ins - physical and virtual
    - LIST Information network opportunities
    - LIST Website resources
    - Alabama state **Science in Motion assistance**
    - NSTA Learning Center membership



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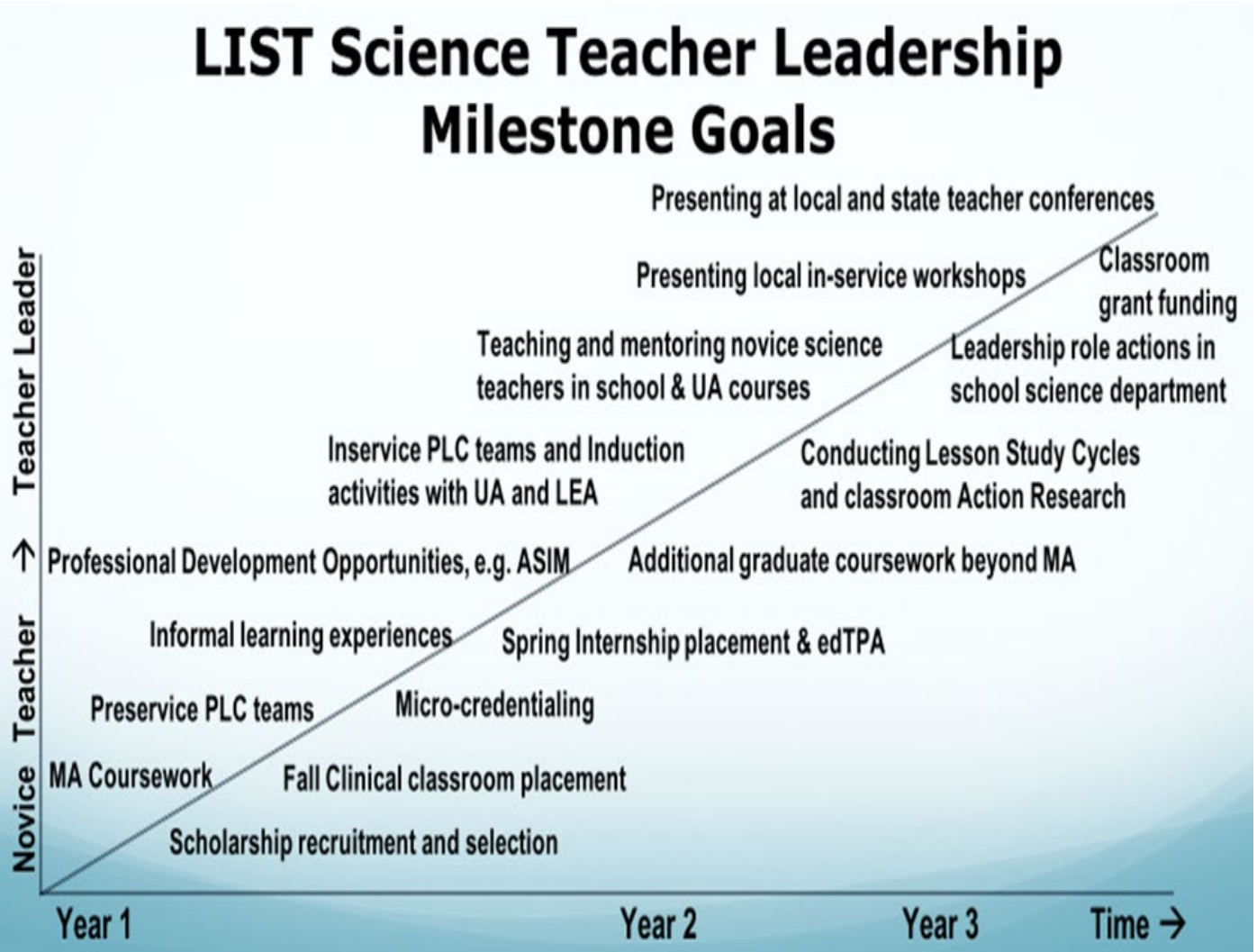
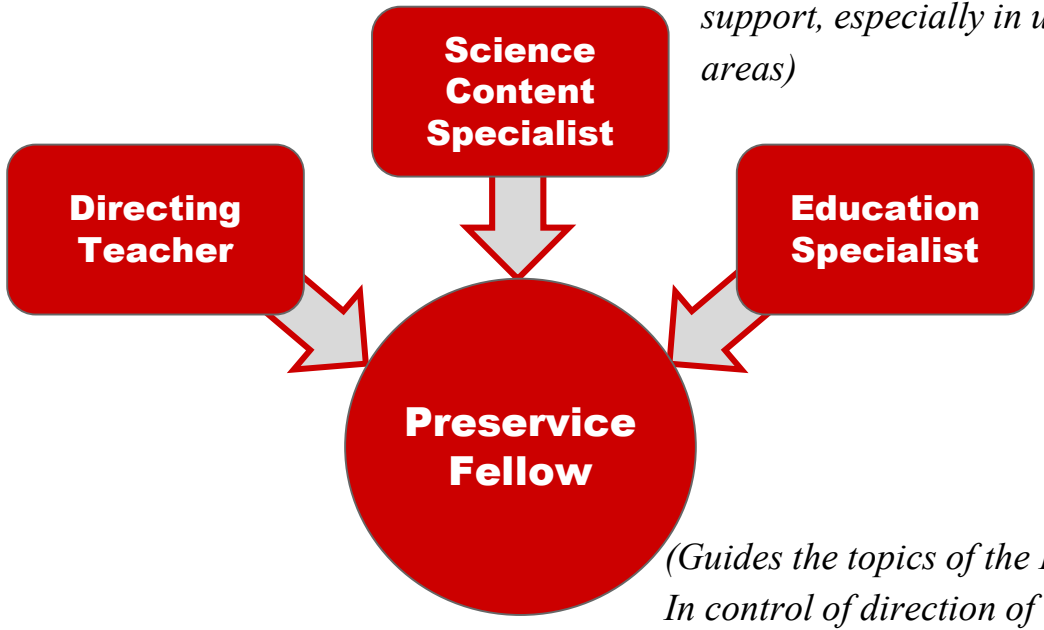


Sample LIST Activities

- Early experience in schools with STEM increasing PCK
- Clinical classroom experiences during methods course included ½ semester in middle school and ½ in high school
- Extended internship class experiences with directing teachers, schools and students during MA coursework
- Extending MA coursework into an EdS degree program
- Professional development content and leadership skills presented through face-to-face, hybrid, online and virtual social media formats
- Involvement in supportive preservice PLC teams beginning during MA courses and throughout inservice teaching.
- Continuous involvement of UA STEM Faculty
- Preservice and inservice PLC team focused on reflection, support and developing leadership skills
- Professional conference presentations and attendance – ASTA, NSTA, SENOYCE, NSF PI, MSERA Conferences

Professional Learning Community 1 (Preservice PLC)



(Science professor provides additional support, especially in unfamiliar content areas)

(Provides consistent critical feedback & support)

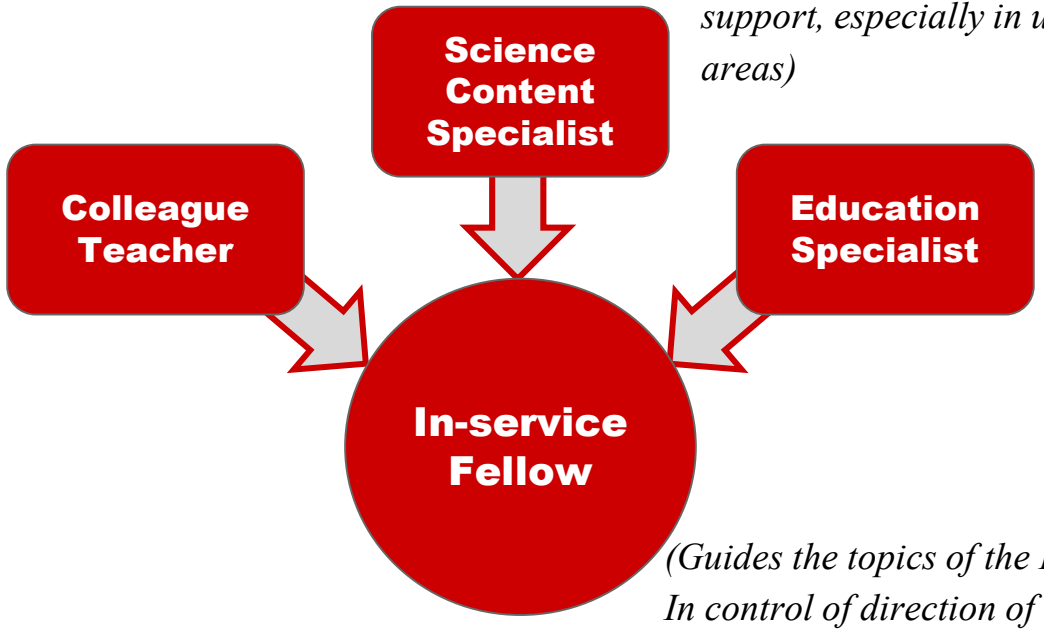
(Experienced educator provides consistent critical feedback & support)

(Guides the topics of the PLC, In control of direction of meeting - voice)

Each teacher is a member of a Professional Learning Community (PLC) unique to their background and pre-service teaching assignments.

(Bond, 2013; Thompson et al., 2013)

Professional Learning Community 2 (In-service PLC)



(Science professor provides additional support, especially in unfamiliar content areas)

(Provides consistent critical feedback & support)

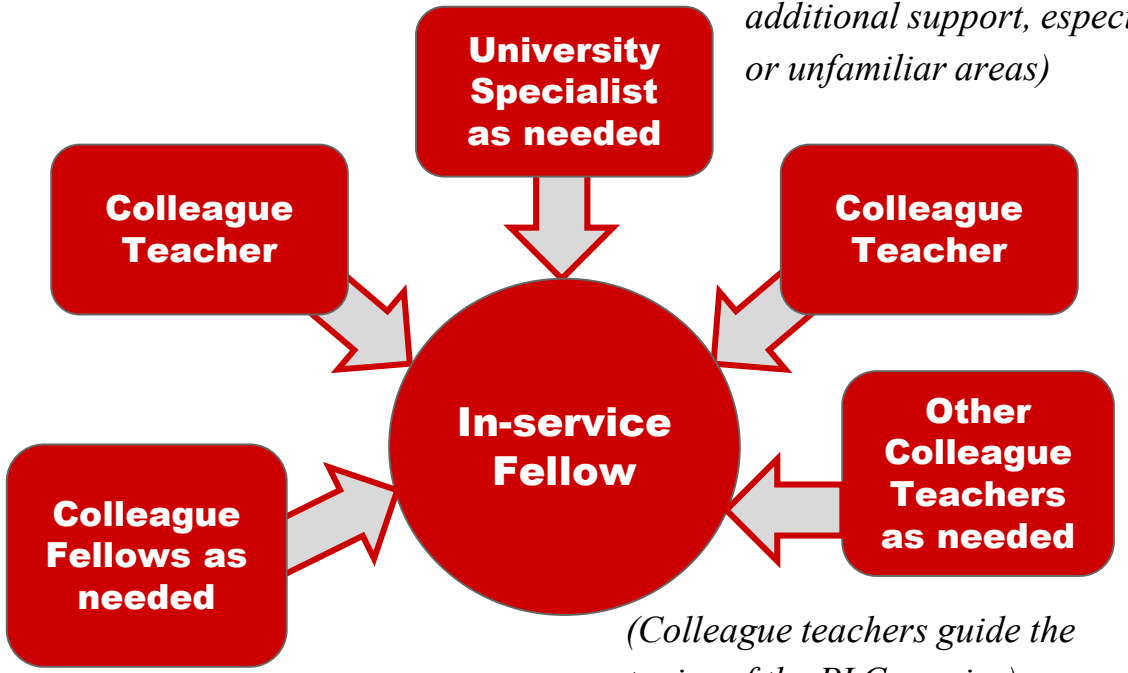
(Experienced educator provides consistent critical feedback & support)

(Guides the topics of the PLC, In control of direction of meeting - voice)

Each teacher is a member of a Professional Learning Community (PLC) unique to their background and teaching assignments.

(Bond, 2013; Thompson et al., 2013) *

Professional Learning Community 3 (Post Induction PLC)



(Science or education professor provides additional support, especially in difficult or unfamiliar areas)

(Experienced local educator provides critical feedback & support)

(Experienced local educators provide consistent critical feedback & support)

(Non-local Fellow provides consistent critical feedback & support)

(Colleague teachers guide the topics of the PLC, - voice)

Each teacher is a member of a Professional Learning Community (PLC) unique to their background and teaching assignments.

(Bond, 2013; Thompson et al., 2013) *

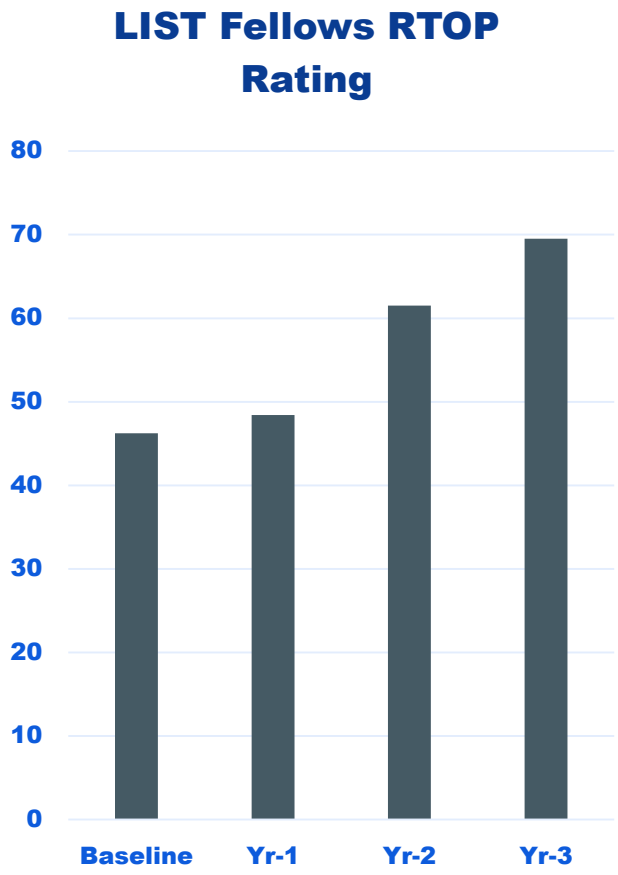
Video of Fellows LIST Description

Social Media List iMovie URL

- https://youtu.be/hWYcyUwW9dE

Study Results

- **Fellows classroom teaching practice before, during, and after the program's induction model were determined through RTOP ratings from classroom lesson observations.**
- **Overall RTOP ratings revealed a statistically significant increase in reformed classroom teaching practices**
- **An RTOP rating of less than 50 is indicative of a more traditional teacher-centered classroom, 60-70 demonstrates a moderate level of classroom student-centered reform (MacIsaac & Falconer, 2002)**



In Comparison Studies

- In a separate study, 45 in-service science teachers in schools in the same geographical area were reported to have a RTOP mean of 51 (Sunal, Stephens & Sunal, 2019a; Sunal et al. 2019b).
- Another study, Stanley (2021), explored teaching skills, confidence, and support provided to three uncertified teachers in local school districts. It was concluded that uncertified teachers lack science teacher identity:
  - deficient self-efficacy
  - underdeveloped professional practices
  - poor PCK
- The LIST program was based on the idea that the best science teachers have a combination:
  - strong science background
  - rigorous teacher education training
  - mentored experience in the classroom

Lessons Learned

- Professional stress situations (i.e. pandemic, personal, and family changes) require ***flexibility, innovation, creativity, and patience***
- Shift from face-to-face to **virtual PLC meetings** during pandemic maintained diverse expertise from local settings, science disciplines, and science education
- Focus on **student learning engagement as the goal** of all innovative change
- Provide **continuous mentoring** throughout induction program to develop science teacher leaders who effectively use student-oriented teaching practices
- Provide for **innovative enhancement and evolution of PLC model** into virtual PLC with continuous application, leading to autonomous use and implementation by science teachers in and between schools
- Realize the **need for virtual informal spaces** enabling Fellows to meet, encourage, share, and support one another
- Utilize expertise of **outside project partner** – Texas STEM Coalition
- Develop **innovative evaluation measures** of teaching performance

Evaluation Summary

- Participants consistently identified their LIST interaction experiences as a time and space for growth, reflection, strategizing, and collaboration.
- As new and as experienced teachers, Fellows put their collective knowledge base into practice through the PLC. The benefits from the PLC applied to teaching, student learning, and to teachers' personal and social development.
- Science teaching quality increased significantly over the program duration.
- Fellows demonstrated increasing leadership capacity presenting at professional conferences, spearheading Zoom PLC work sessions, and mentoring less experiences science teachers.
- Fellows worked to make instructional changes to their own practice in order to meet the needs of their own students.
- Fellows were recognized at local schools as exemplary teachers and teacher leaders.
- Fellows developed as a cohesive group and assisted in sustaining each other as science teachers in high needs schools.

Discussion Groups

Form break out discussion groups

1. **Come to a consensus on**
   - **What should be the key characteristics of a successful transformative induction model**
   - **What are transferability and scaling concerns**

2. **Summarize key factors discussed that were related to using a transformative induction model**

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Questions?

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