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Creating New Learning Environments with Advanced Learning Technologies

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Creating New Learning Environments with Advanced Learning Technologies

A Summary of Research Projects

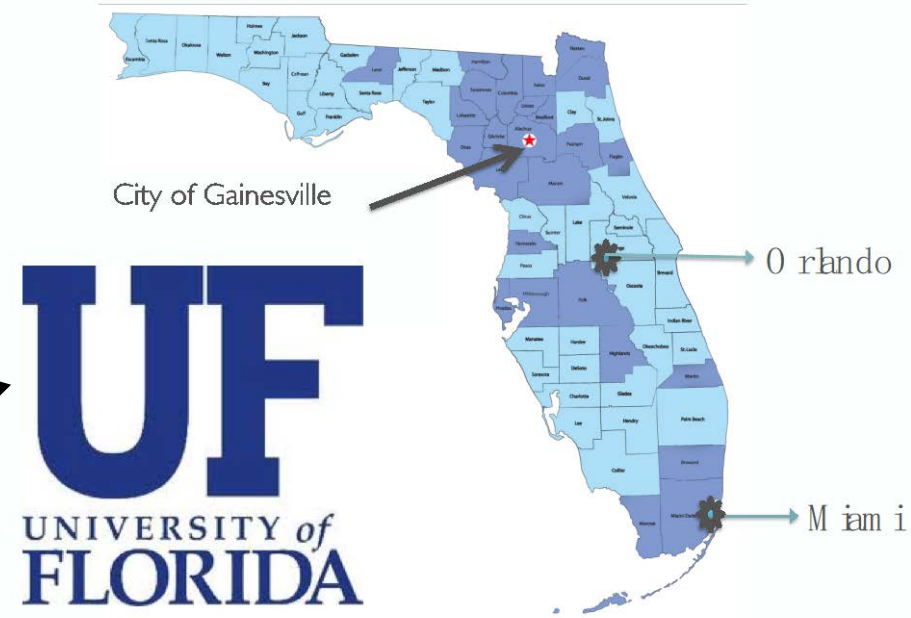
University of Florida Online Learning Institute (OLI)

and

Florida Online Research Consortium (FORC)

Tom Dana, Professor and Senior Associate Dean, Director of OLI and FORC

Where is the University of Florida?



UF
UNIVERSITY of
FLORIDA

Overview of Selected Labs and Projects

Precision Education: Virtual Learning Lab

Lead Researchers: Carole Beal, Corinne Huggins-Manley, Phillip Poekert

Funding Agency: Institute of Education Sciences

Description: Conduct studies with scholars in informatics, math education and professional development for teachers using large-scale education data from prior students — such as standardized test scores, administrative records from schools and universities, and teaching methods used — to personalize the learning experience for future individual students. The goal is to advance a new approach for exploring massive sets of archived student data to update and personalize virtual instruction for future math students.

Converging Behavioral and Psychophysiological Measures: Evaluating Multimedia Learning Conditions with Dyslexic Learners

Lead Researcher: Kara Dawson

Funding Agency: Institute of Education Sciences

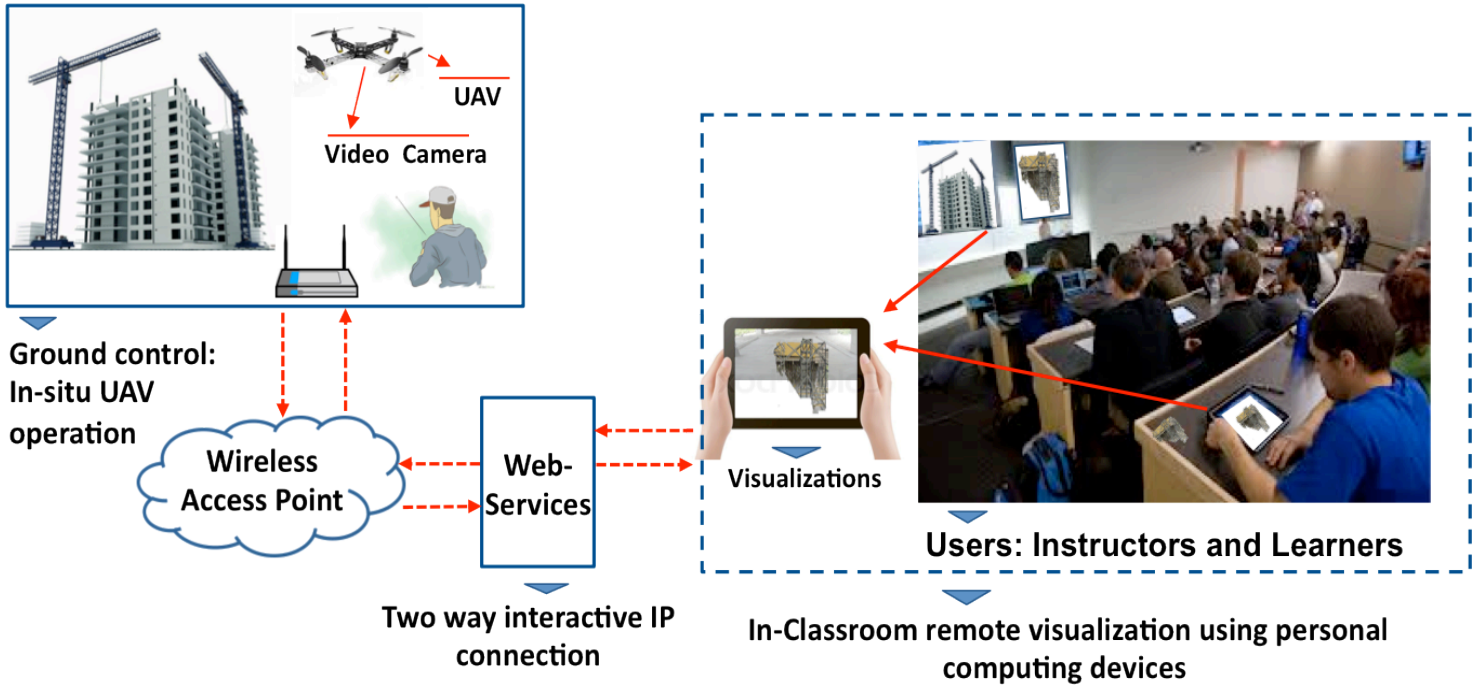
Description: Quasi-experimental study examining the influence of multimedia learning conditions on learning (recognition and recall) for college students with and without dyslexia.

iDigFossils: Engaging K-12 Students in Integrated STEM via 3D Digitization, Printing and Exploration of Fossils

Lead Researcher: Pasha Antonenko
Funding Agency: National Science Foundation.
Description: The goal of this project is to expand and extend our understanding of integrated STEM learning by designing and testing a model for student engagement using 3D scanning and printing, and computational modeling within a highly relevant but unexplored educational pathway to K-12 STEM – paleontology.

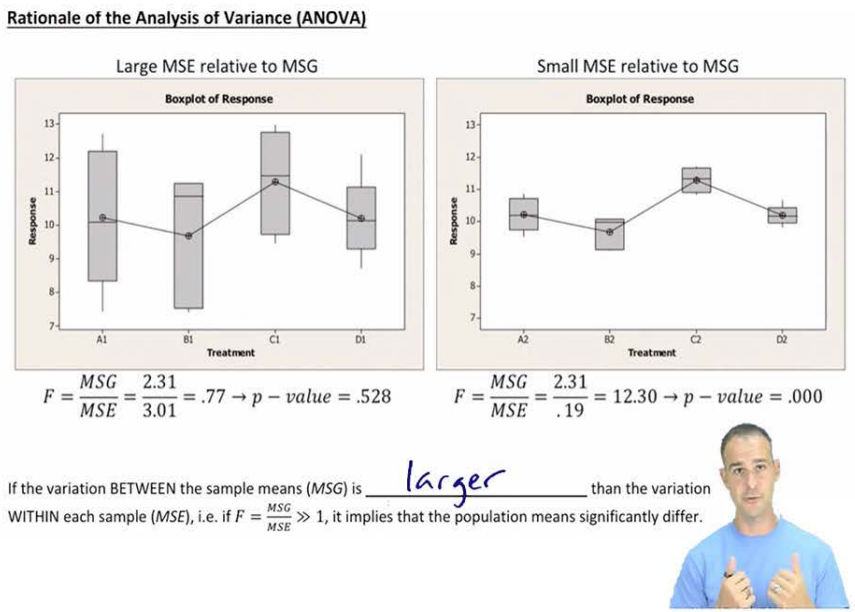
Cyber-Eye: Empowering Learning through Remote Visualizations Using Unmanned Aerial Systems

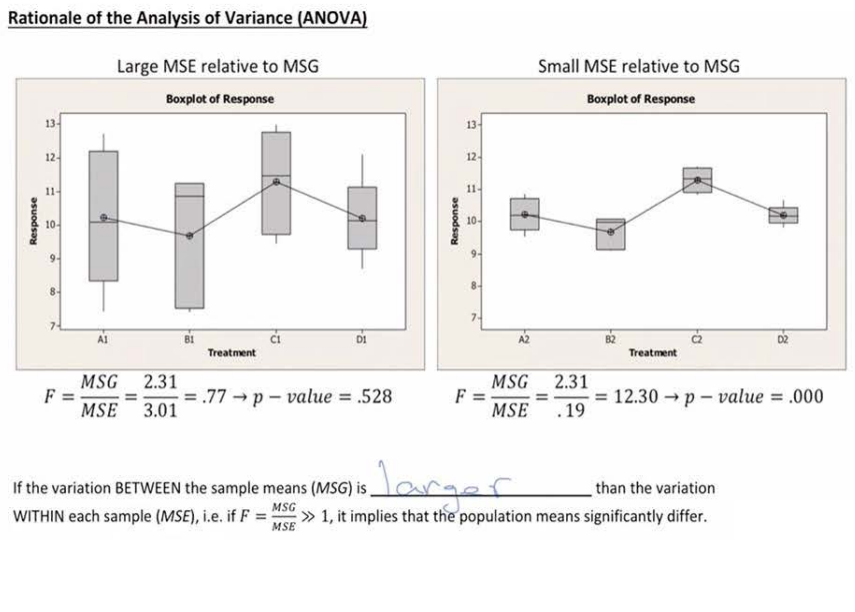
Lead Researcher: Pasha Antonenko
Funding Agency: National Science Foundation.
Description: This project focuses on using Unmanned Aerial Systems in Construction Engineering and Management courses to bring remote job-site environments into the classroom and enhance students' processing of complex spatial and temporal information.



Project LENS: Leveraging Expertise in Neurotechnologies to Study Individual Differences in Multimedia Learning

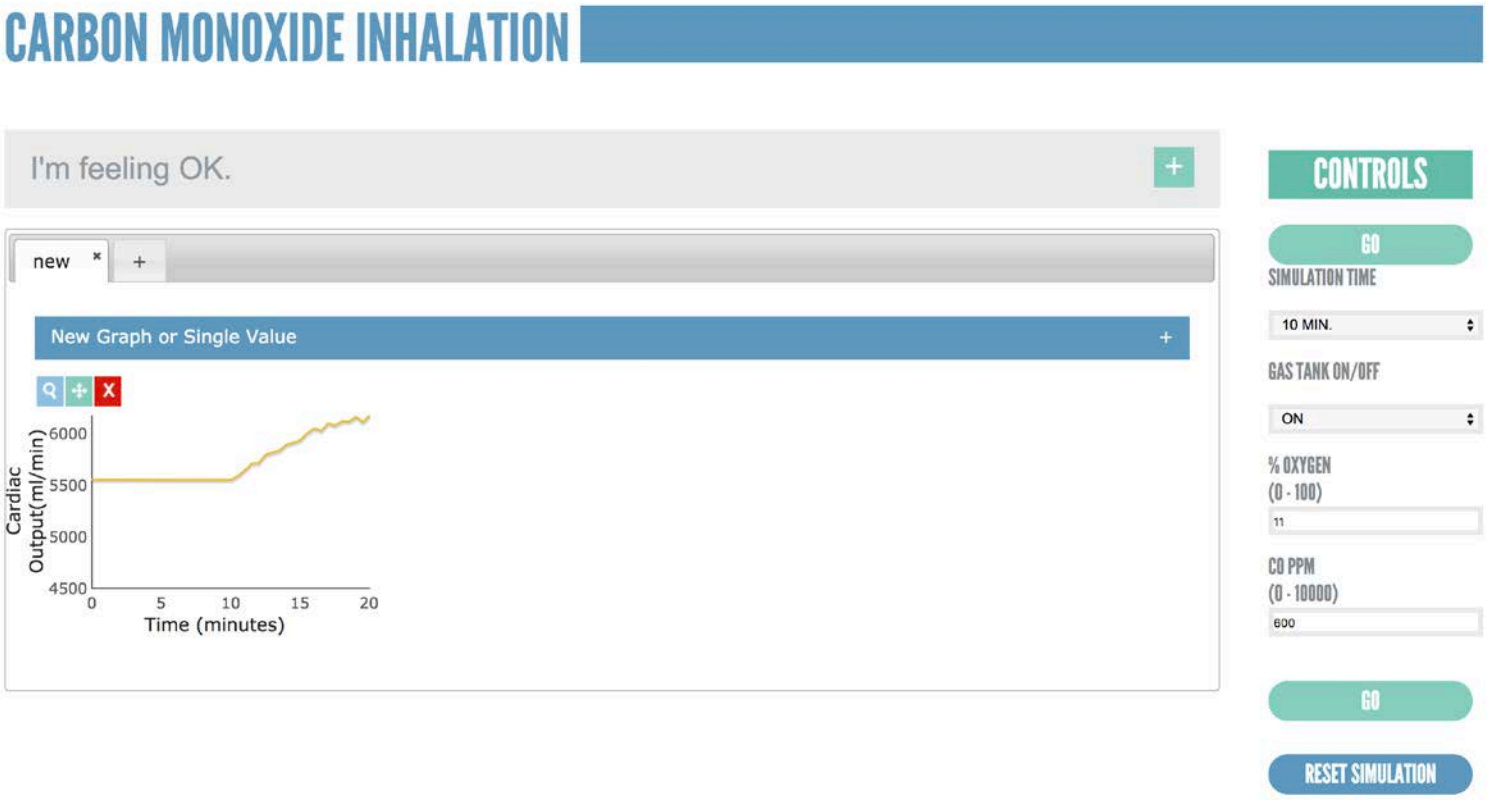
Lead Researcher: Pasha Antonenko
Funding Agency: National Science Foundation.
Description: Project LENS focuses on establishing an interdisciplinary collaborative network of scholars that use Electroencephalography, eye tracking, and functional Near Infrared Spectroscopy to understand multimedia learning within a diverse population of students that exhibit attentional and cognitive differences.





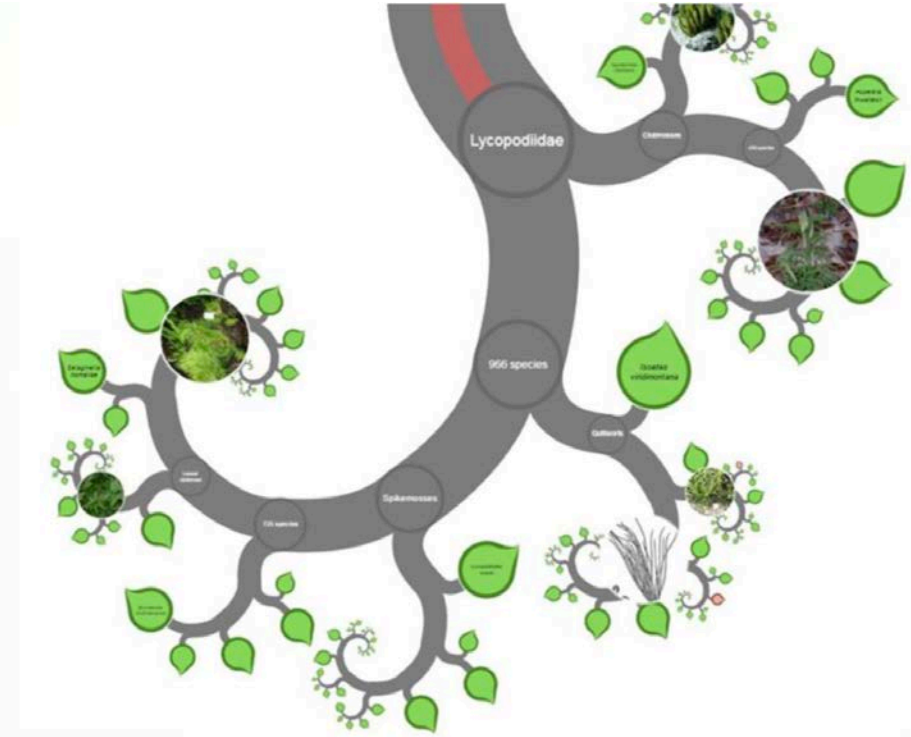
A Simulation-Based Application for Teaching Human Physiology through Guided Discovery, Pure Discovery, and Authentic Research

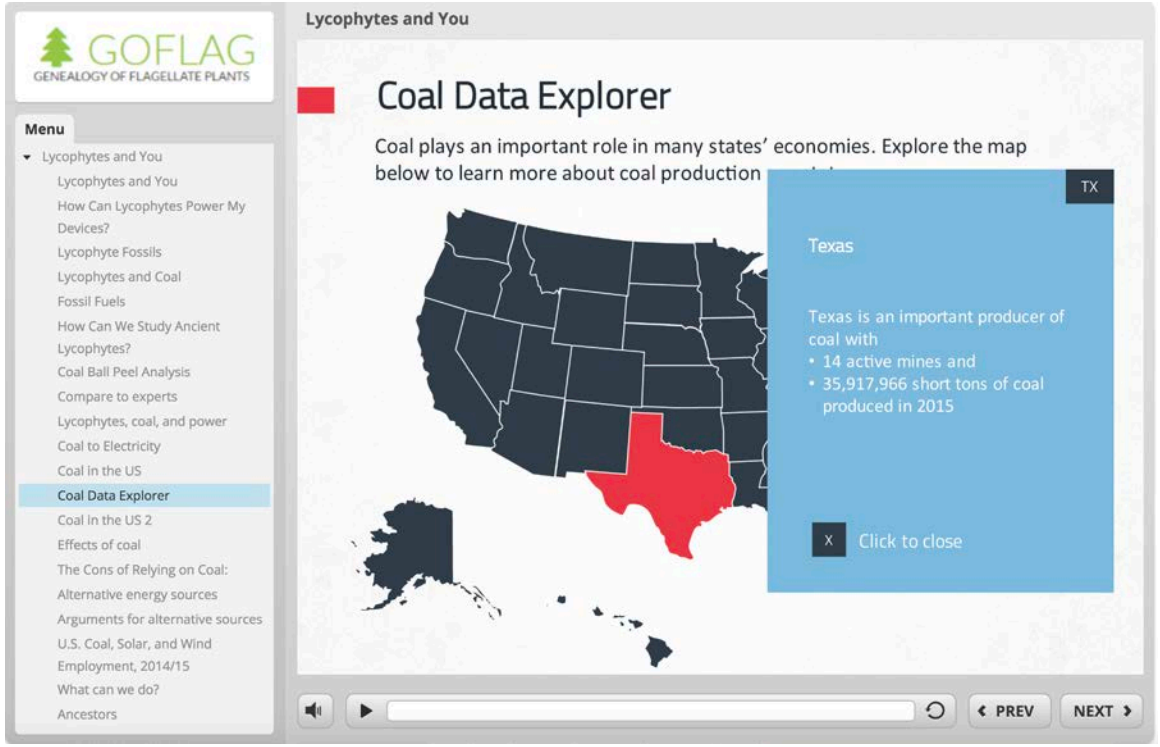
Lead Researcher: Pasha Antonenko. Funding Agency: National Science Foundation.
Description: The goal of this project is to develop an online computational simulation enhanced with learning analytics which undergraduate students can use to learn human physiology using both guided and pure discovery, and by designing, conducting and analyzing the results of authentic, simulation-based research.



Building a Comprehensive Evolutionary History of Flagellate Plants

Lead Researcher: Pasha Antonenko
Funding Agency: National Science Foundation.
Description: My role in this project is to design, develop, and evaluate the usability and efficacy of a web-based learning tool (The Flagellate Plant Phylogeny Voyager) and online library of teachable units for teaching flagellate plant diversity and systematic biology using inquiry and hypothesis driven formats.





NeuroSynch: Understanding Collaborative Problem Solving via Research on Team Neurosynchronies

Lead Researcher: Pasha Antonenko Funding Agency: National Science Foundation.
Description: This project employs neurotechnologies such as EEG and eye tracking to explore the differences between problem solving teams and individuals as they use various collaboration scaffolds.

Are We Really What We Eat?

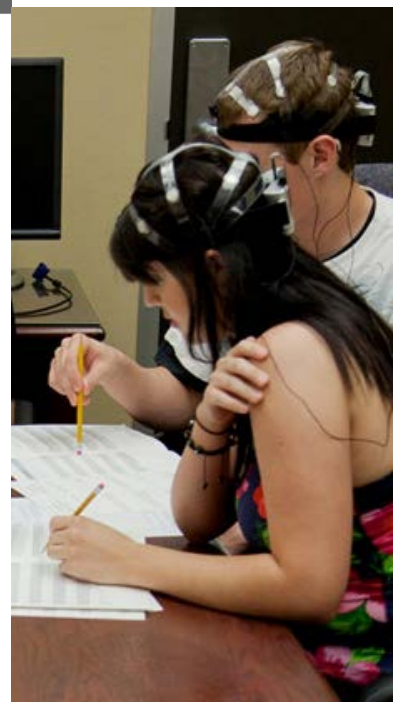
CONTEXT | OBESITY: INTERNATIONAL TRENDS | ENERGY ALLOWANCE | DIETARY ALLOWANCE | MEALS AROUND THE WORLD | OBESITY FACTS | OBESITY AND CULTURE

Meals Around the World

Many factors influence food choices. Some of these factors result from cultural differences and habit. For example, protein needs can be met by different combinations of foods. In the United States, we look primarily to meat, eggs, and dairy products for protein. To many Eskimos and Japanese, protein often means fish; to a Mexican it may be a rice-bean combination.

The food energy, protein, iron, and vitamin B1 in meals from several cultures are listed for comparison below.

	Food Energy (cal)	Protein (g)	Iron (mg)	Vitamin B1 (mg)
Chinese	797	36	10.5	0.66
Eskimo	872	94	19.0	0.6
Japanese	766	47	8.8	0.56
Mexican	889	27	11.0	1.14
Ugandan	828	32	6.5	0.8
U.S.	1212	30	6.9	0.33



Creative Technology Research Lab (CTRL)

Research Director: Maya Israel

Mission: How to more effectively teach STEM content to students with disabilities and risk for academic failure

Teaching All Computational Thinking through Inclusion and Collaboration (TACTIC). Studies of instructional strategies that increase engagement and learning if computer science for students with disabilities in grades 3 to 8.

Learning Trajectories for Everyday Computing (LTEC-2). Studies on the development and refinement of learning trajectories in the context of elementary school mathematics curriculum and instruction.

Shifting education

CTRL+shift

Creative Technology Research Lab

Early Learning Florida

Lead Researchers: Abby Thorman, Phillip Poekert

Funding Agency: State of Florida and Private Donors

Description: **Online professional development system for early childhood professionals. Served 400,000+ hours of content to 30,000+** teachers and leaders in Florida, California, Louisiana, Georgia, South Carolina, and Arizona

Studies found up to **79% improvement** in teacher-child interaction and up to **82% improvement** in teacher knowledge. **26% higher growth rate** improvement across four domains of child development

Custom-built digital platform launching in Fall 2018 will house new elements, including social learning networks, customizable resource galleries, and Quick Tip videos

Algebra Nation: A Teaching and Learning Ecosystem

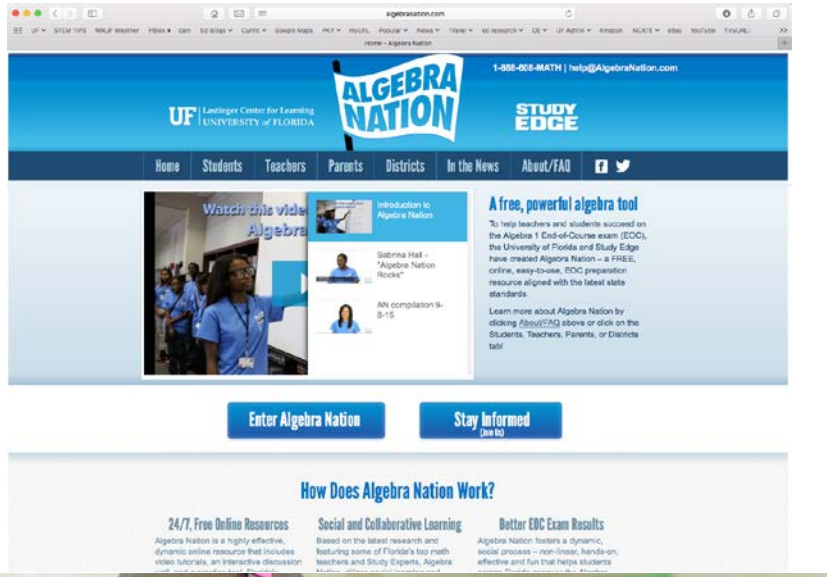
Lead Researchers: Phillip Poekert, Thomasenia Adams

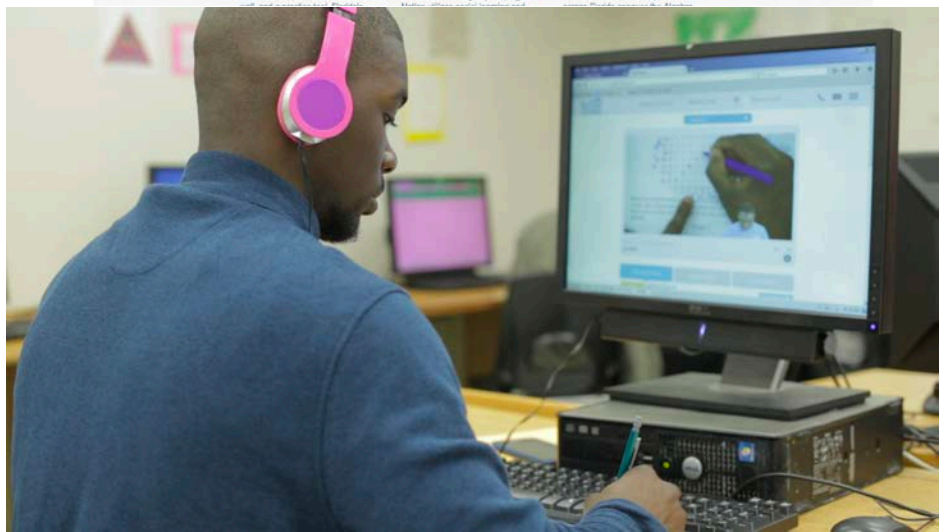
Funding Agency: State of Florida and the Lastinger Center for Learning

Description:
Innovative teaching and learning system designed to improve student achievement in mathematics and workforce readiness. Standards-aligned instructional micro-videos, rigorous practice tool with real-time feedback, and social learning platform to connect with peers

500,000+ student users and 25,000+ teacher users each year. Available in New York City, Florida, South Carolina, Michigan, Mississippi, and Alabama

Multiple studies have **found significant impact on student achievement.**





School Resource Office (SRO) Training: Phase 1

Lead Researchers: Dorothy Espelage, Philip Poekert

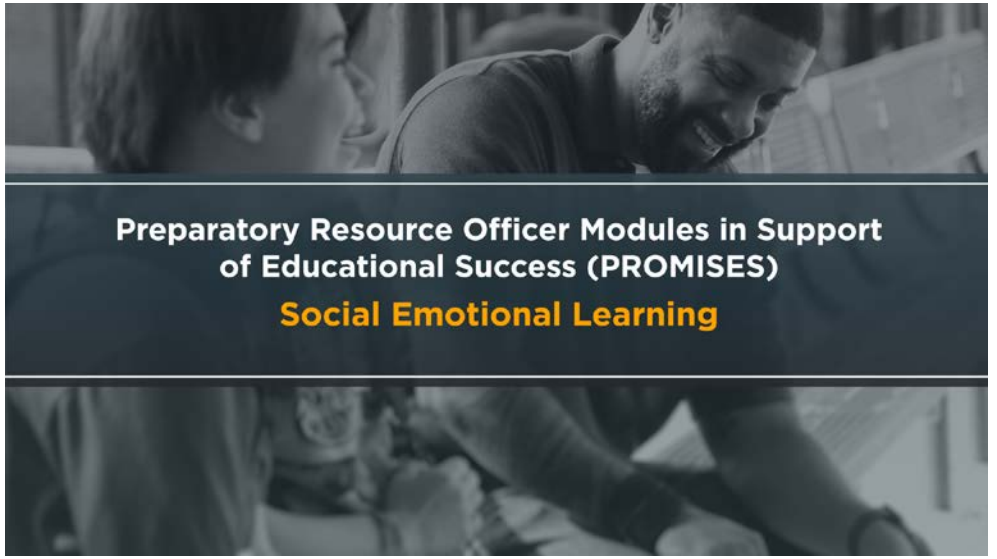
Funding Agency: Institute of Education Sciences

Description:
Online training for SROs on competencies specific to child development and youth behavioral and mental health

Content areas include: Trauma-Informed Care (TIC), Social-Emotional Learning (SEL), Restorative Practices and Problem Solving, Cultural Competence, Implicit Bias, and Intersectionality

Phase 1 professional development modules with Miami-Dade County SROs in research-based, best-practice techniques for addressing the unique needs of the school environment

Implement and collect data for personalization and scale up nationally

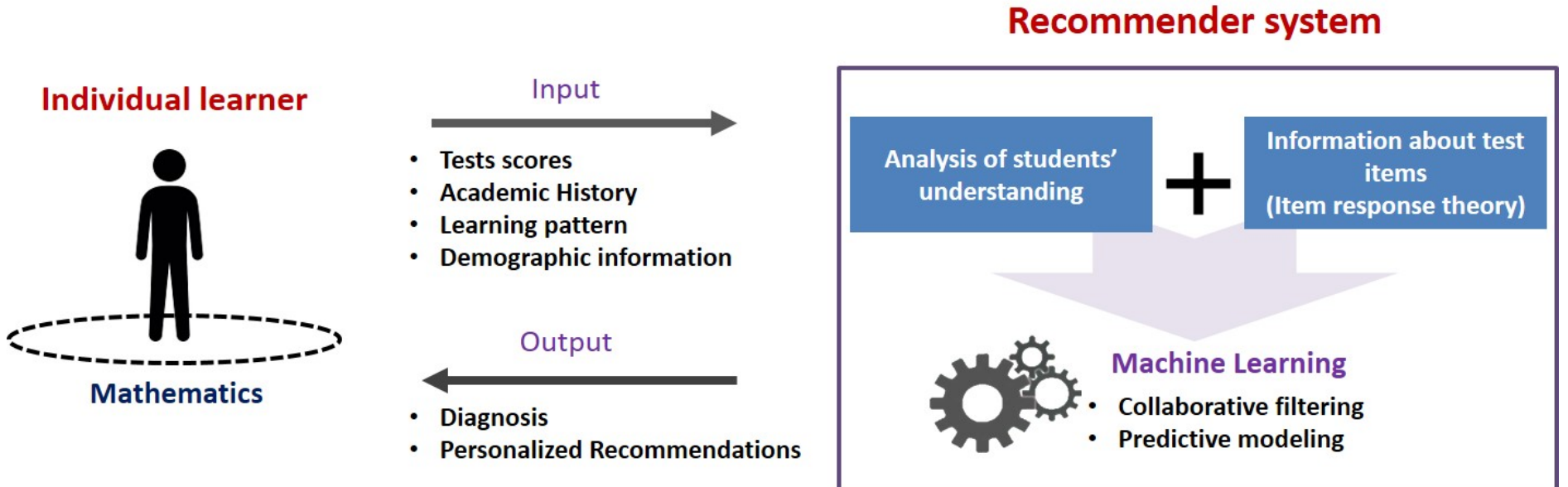


Machine Learning Algorithms: Investigating an Intelligent Recommendation System in High School Mathematics.

Lead Researcher: Dongho Kim

Description: Explore machine learning algorithms for developing an intelligent recommendation system. This initial study in South Korea is part of a larger project that will be focus on identifying, implementing, and improving machine learning algorithms to develop an intelligent recommendation system in high school mathematics.

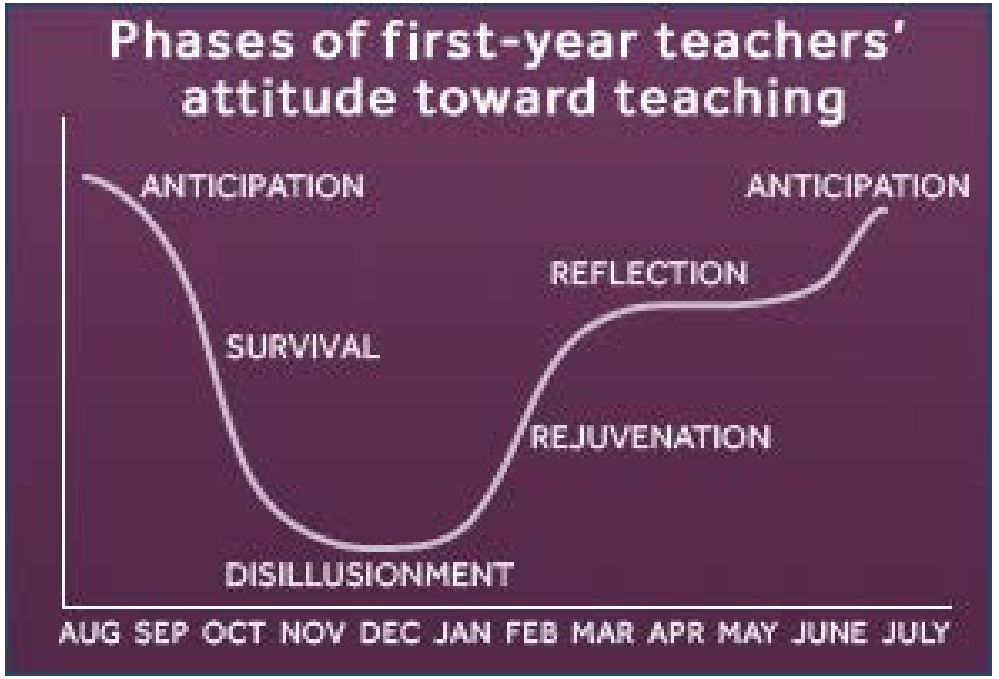
The intelligent recommendation system will collect information on students' test scores, learning patterns, academic history, demographic information, determine students' strengths and weakness, and combine collaborative filtering and predictive modeling to recommend a learning path tailored to individual students.



A Platform for Improving the Induction and Professional Development Support of New Science and Mathematics Teachers

Lead Researchers: Tom Dana and Griff Jones

- In the USA, many pathways to STEM teaching
- Everyone has a first year of teaching
- Some STEM teachers remain disillusioned at year end



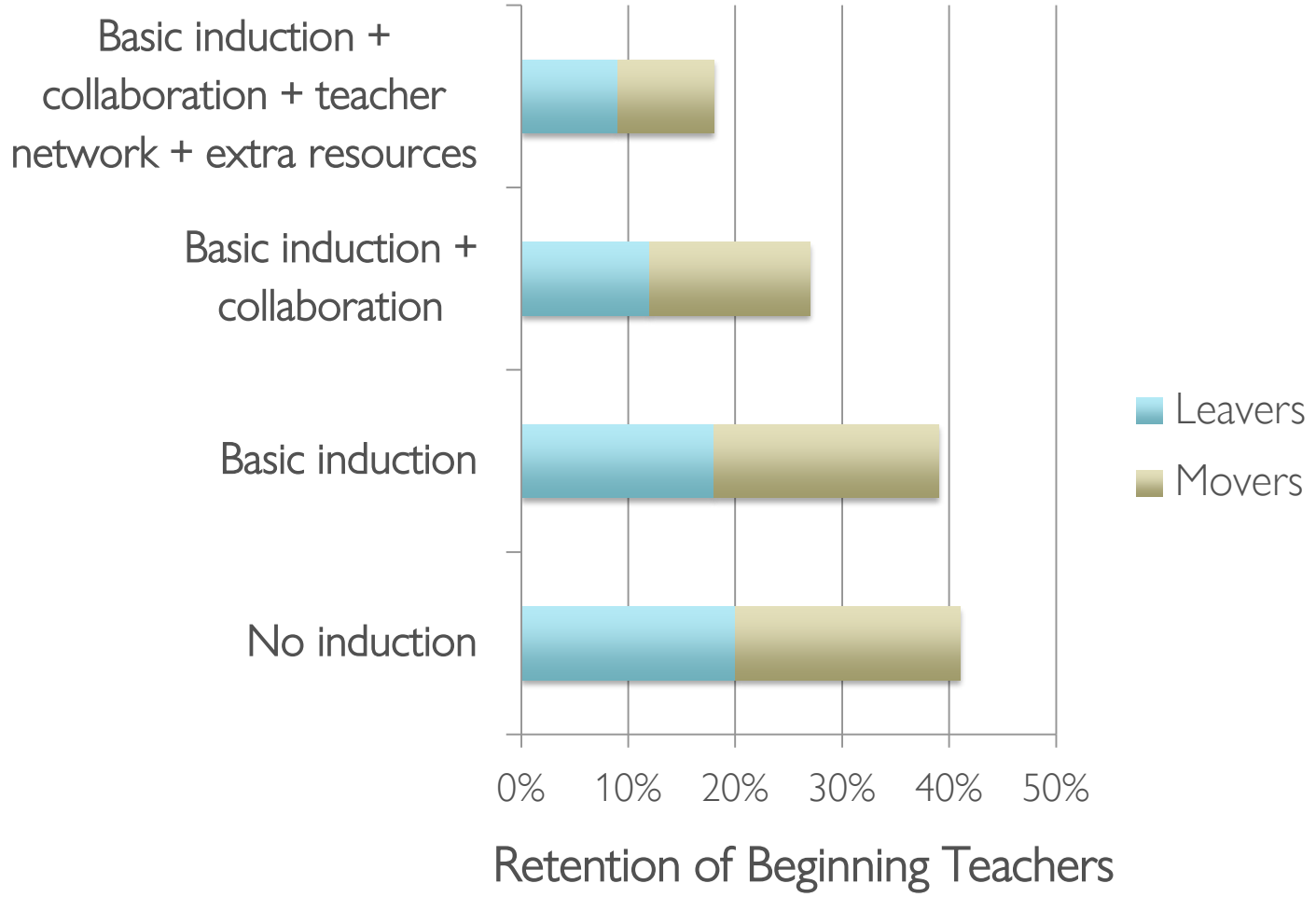
STEM Teacher Turnover

Scale of Turnover in Florida

- Florida has ~3000 new mathematics and science teachers
- ~42% of new STEM teachers leave the profession within 5 years
- Rate is one-third higher (60%) in "challenging" urban schools

Goal: consistently produce >80% retention

Differential Approaches

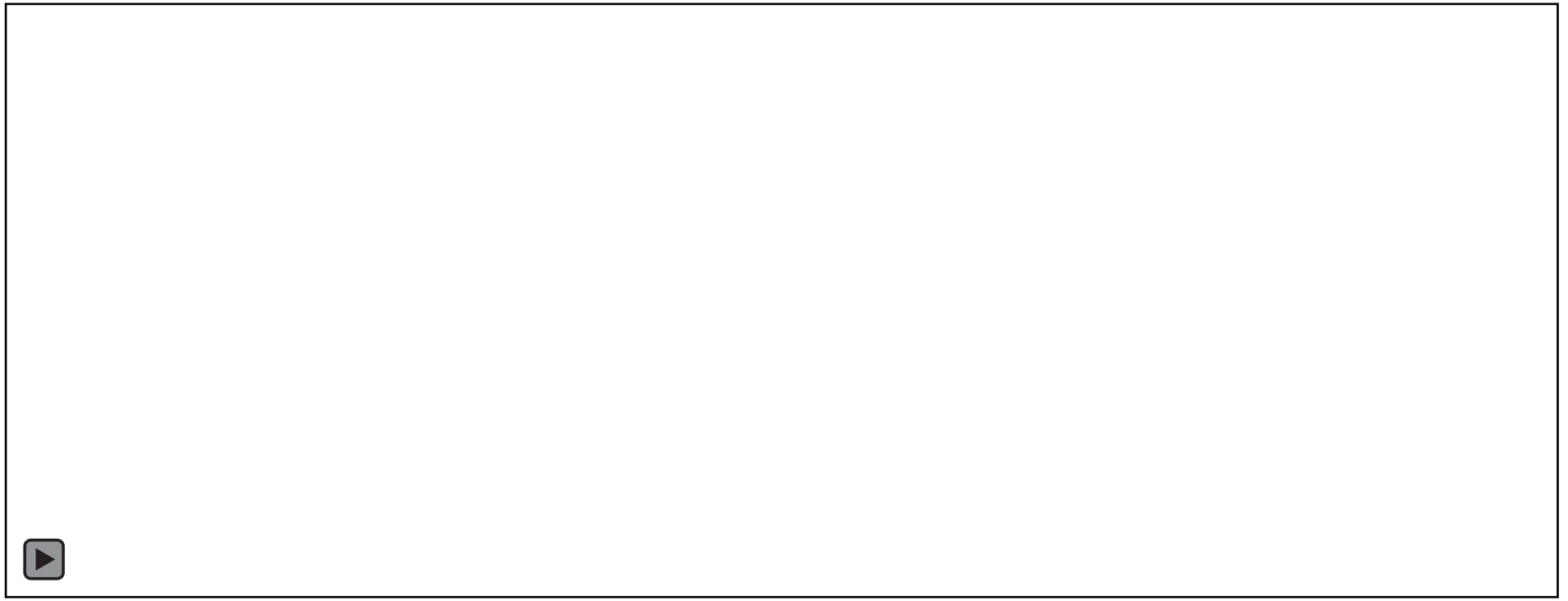


Research Aim

Utilize research schema from informatics and STEM teacher education to generate data from new STEM teachers. Data set includes academic performance, school neighborhood and demographic placement, pupil performance data, and interaction on platform (support for induction, collaboration, networking, resources) to personalize the professional development experience for new STEM teachers in order to increase retention.

Initial Phase: Build Evidence-Based Platform

STEM-TIPS Teacher Induction Platform



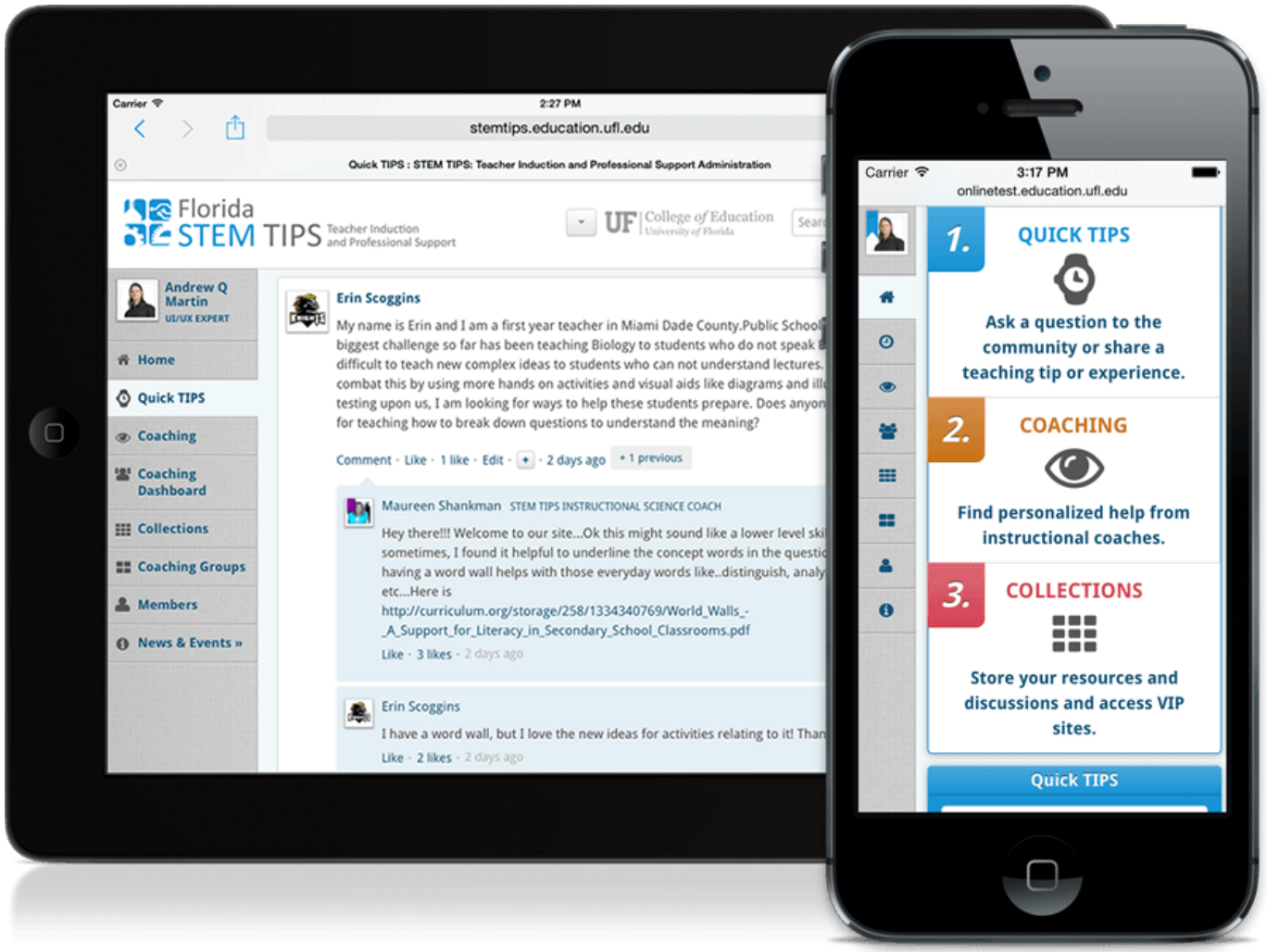
STEM TIPS

Teacher **I**nduction and **P**rofessional **S**upport

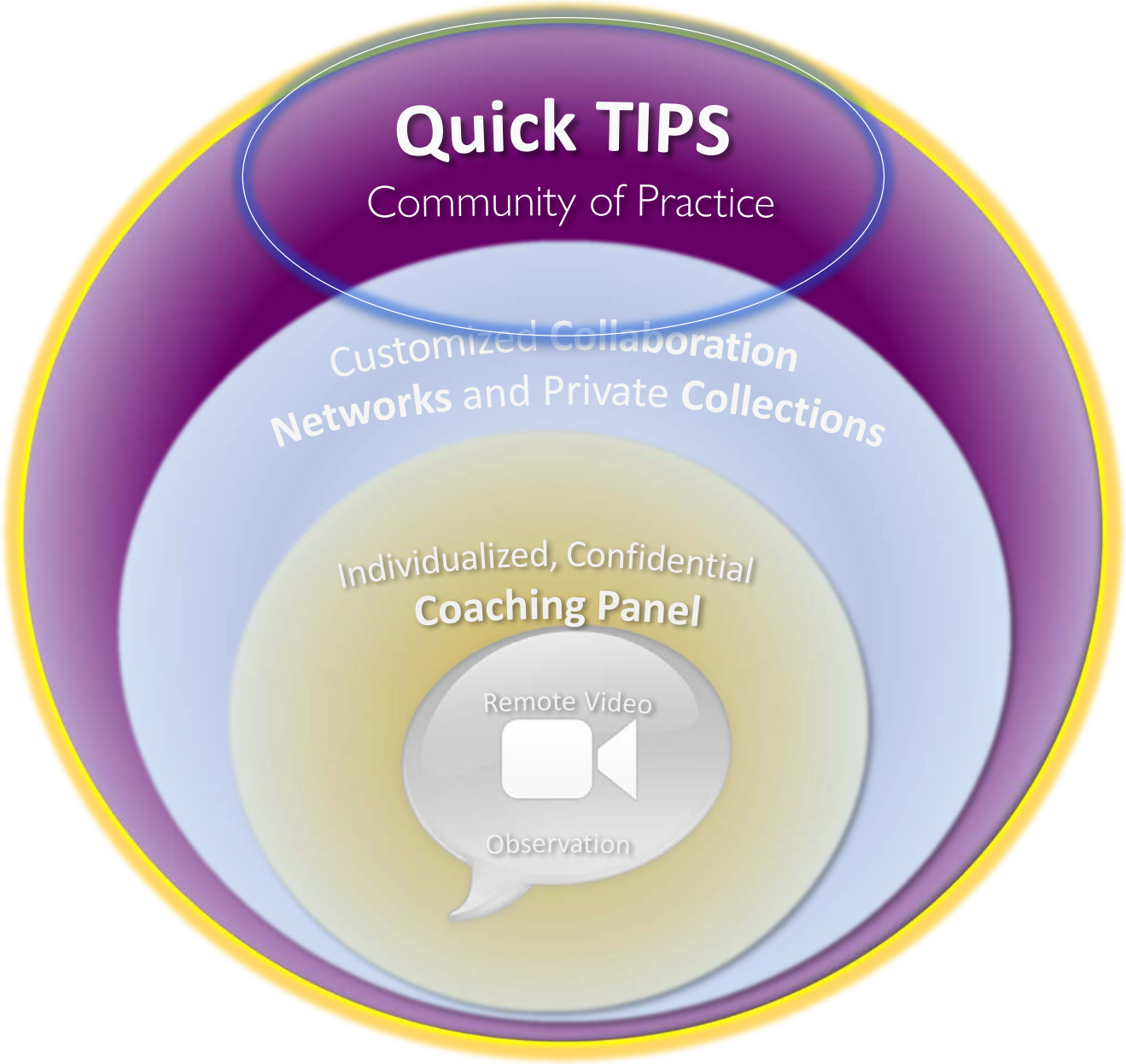
Just-in-Time, personalized support

1st & 2nd year STEM teachers

Experienced teachers with a new STEM preparation

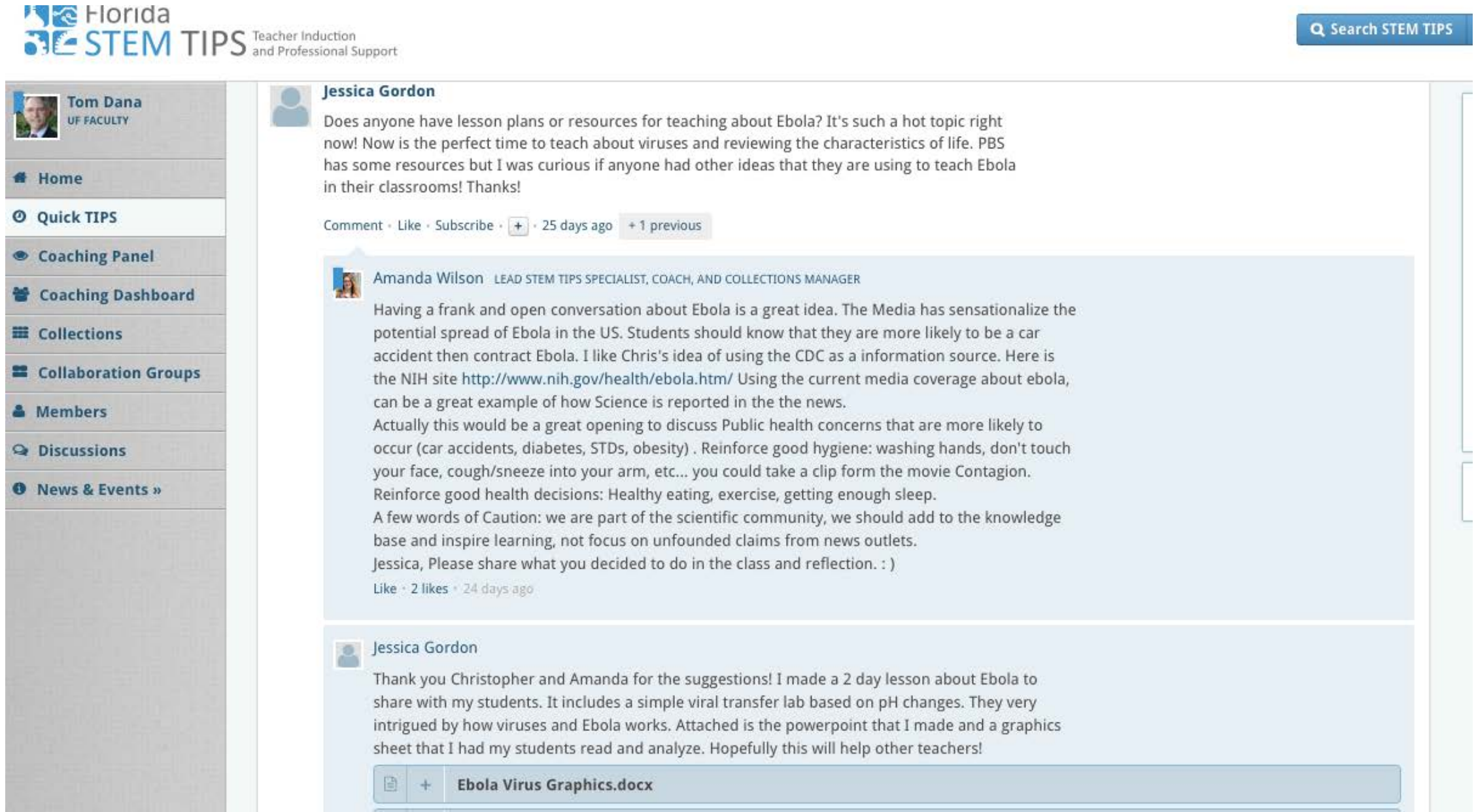


Layer #1: Quick TIPS Community of Practice

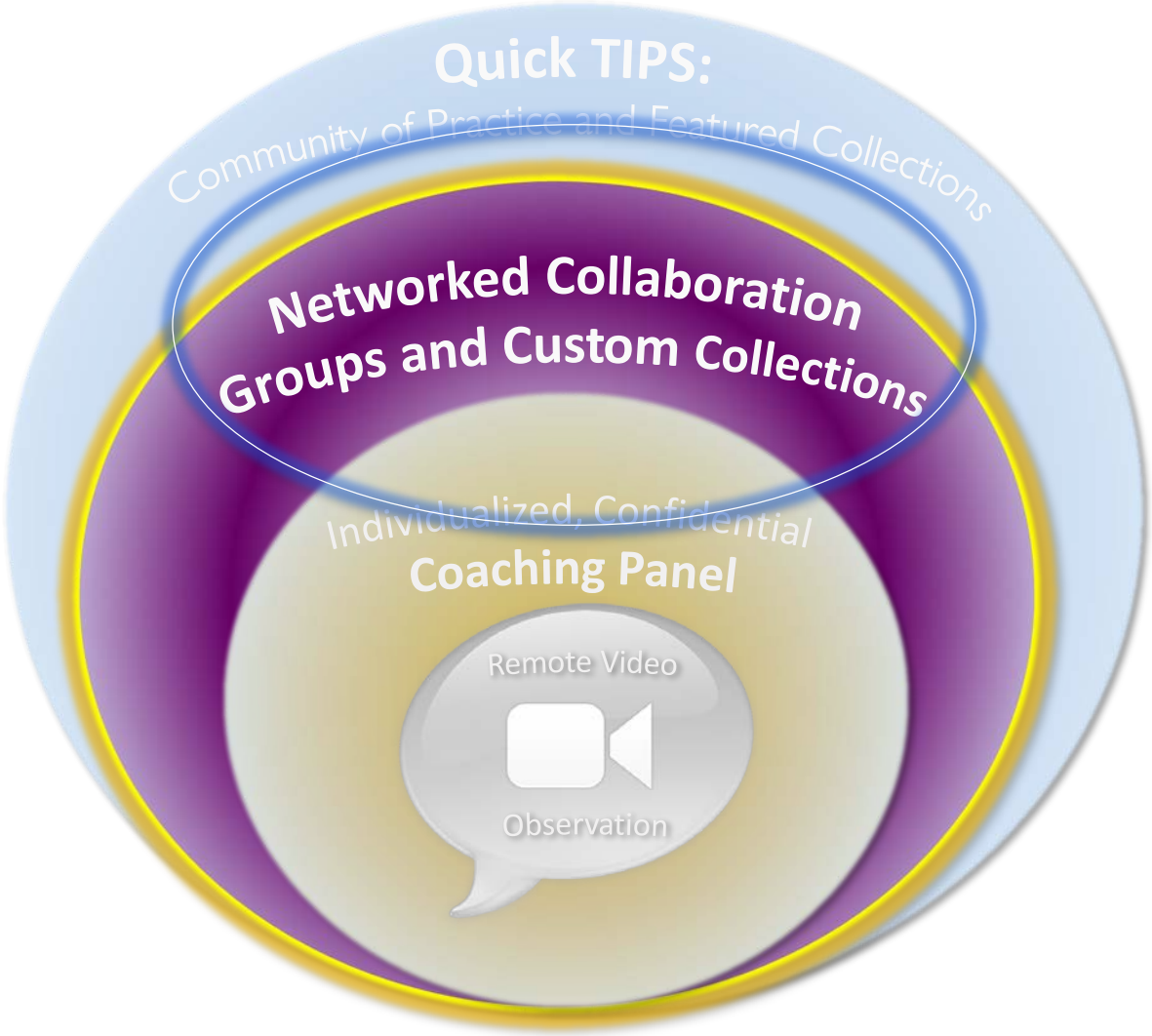


- Teachers, mentors, and instructional coaches create and monitor **discussions** within the entire STEM TIPS Community -- asynchronously and synchronously
- Share **resources** such as lesson guides, articles, and videos
- Currently 1095 professionals are active in Quick TIPS

Quick Tips


Florida STEM TIPS Teacher Induction and Professional Support
Search STEM TIPS
Tom Dana
UF FACULTY
Home
Quick TIPS
Coaching Panel
Coaching Dashboard
Collections
Collaboration Groups
Members
Discussions
News & Events »
Jessica Gordon
Does anyone have lesson plans or resources for teaching about Ebola? It's such a hot topic right now! Now is the perfect time to teach about viruses and reviewing the characteristics of life. PBS has some resources but I was curious if anyone had other ideas that they are using to teach Ebola in their classrooms! Thanks!
Comment · Like · Subscribe · + · 25 days ago + 1 previous
Amanda Wilson LEAD STEM TIPS SPECIALIST, COACH, AND COLLECTIONS MANAGER
Having a frank and open conversation about Ebola is a great idea. The Media has sensationalize the potential spread of Ebola in the US. Students should know that they are more likely to be a car accident then contract Ebola. I like Chris's idea of using the CDC as a information source. Here is the NIH site http://www.nih.gov/health/ebola.htm/ Using the current media coverage about ebola, can be a great example of how Science is reported in the the news.
Actually this would be a great opening to discuss Public health concerns that are more likely to occur (car accidents, diabetes, STDs, obesity) . Reinforce good hygiene: washing hands, don't touch your face, cough/sneeze into your arm, etc... you could take a clip form the movie Contagion.
Reinforce good health decisions: Healthy eating, exercise, getting enough sleep.
A few words of Caution: we are part of the scientific community, we should add to the knowledge base and inspire learning, not focus on unfounded claims from news outlets.
Jessica, Please share what you decided to do in the class and reflection. :)
Like · 2 likes · 24 days ago
Jessica Gordon
Thank you Christopher and Amanda for the suggestions! I made a 2 day lesson about Ebola to share with my students. It includes a simple viral transfer lab based on pH changes. They very intrigued by how viruses and Ebola works. Attached is the powerpoint that I made and a graphics sheet that I had my students read and analyze. Hopefully this will help other teachers!
Ebola Virus Graphics.docx

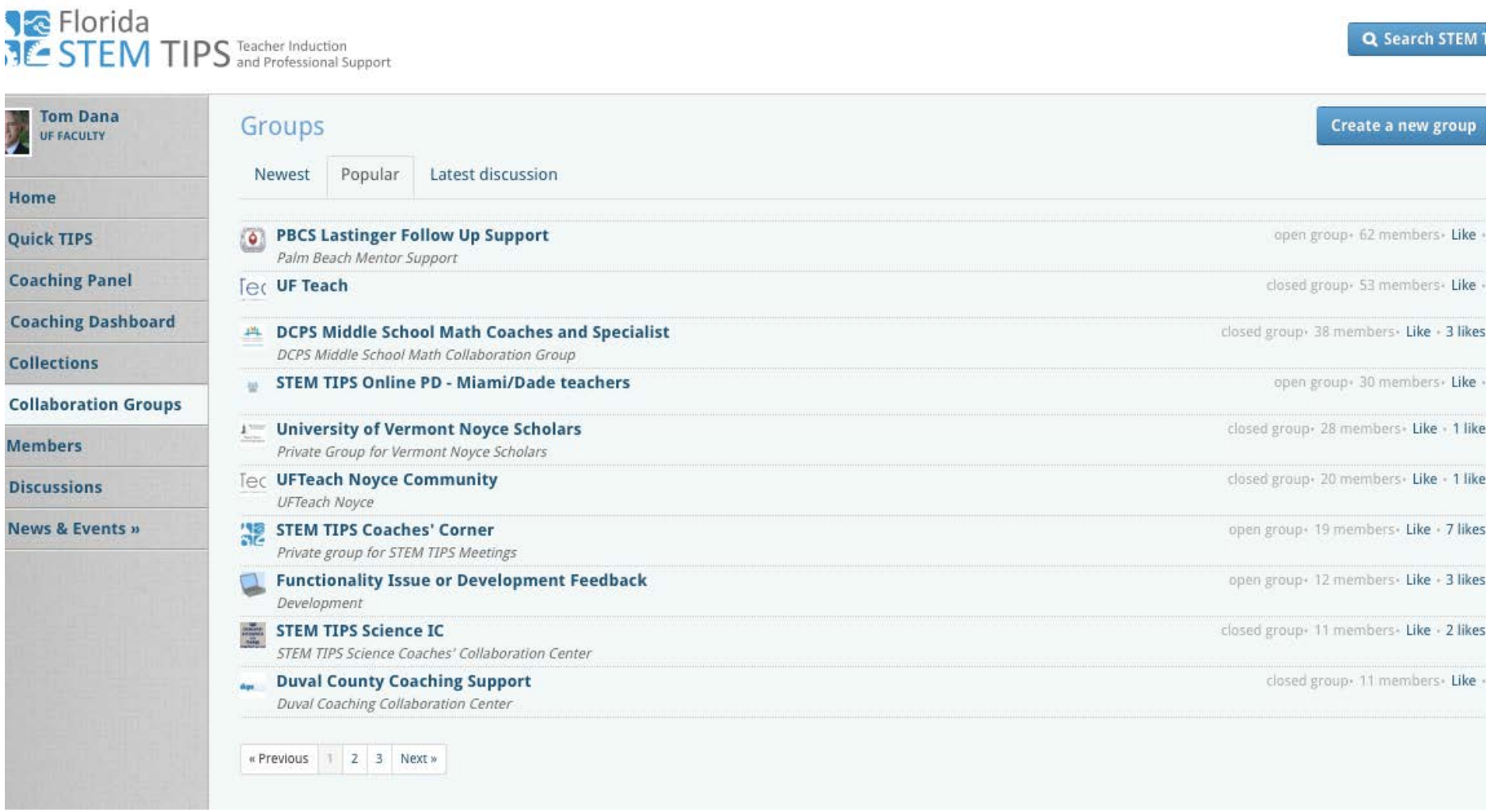
Layer #2: Collaboration Groups



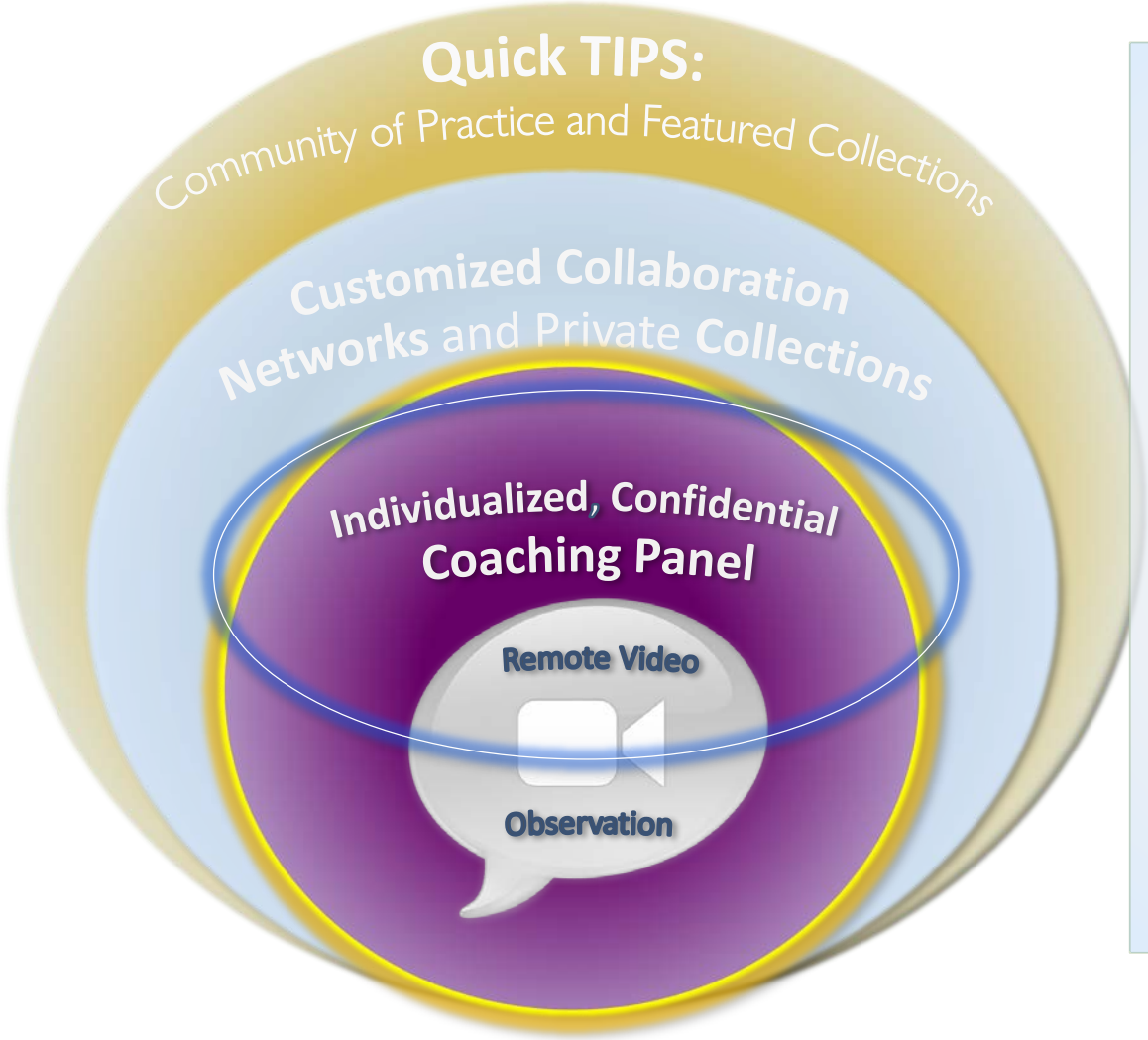
Supports specific user groups with **shared interests**

Examples are **subject matter** (e.g., physics teachers), **lesson concerns** (e.g., laboratory exercises), **acquiring proper supplies** (e.g., demonstration equipment)

Collaboration Groups

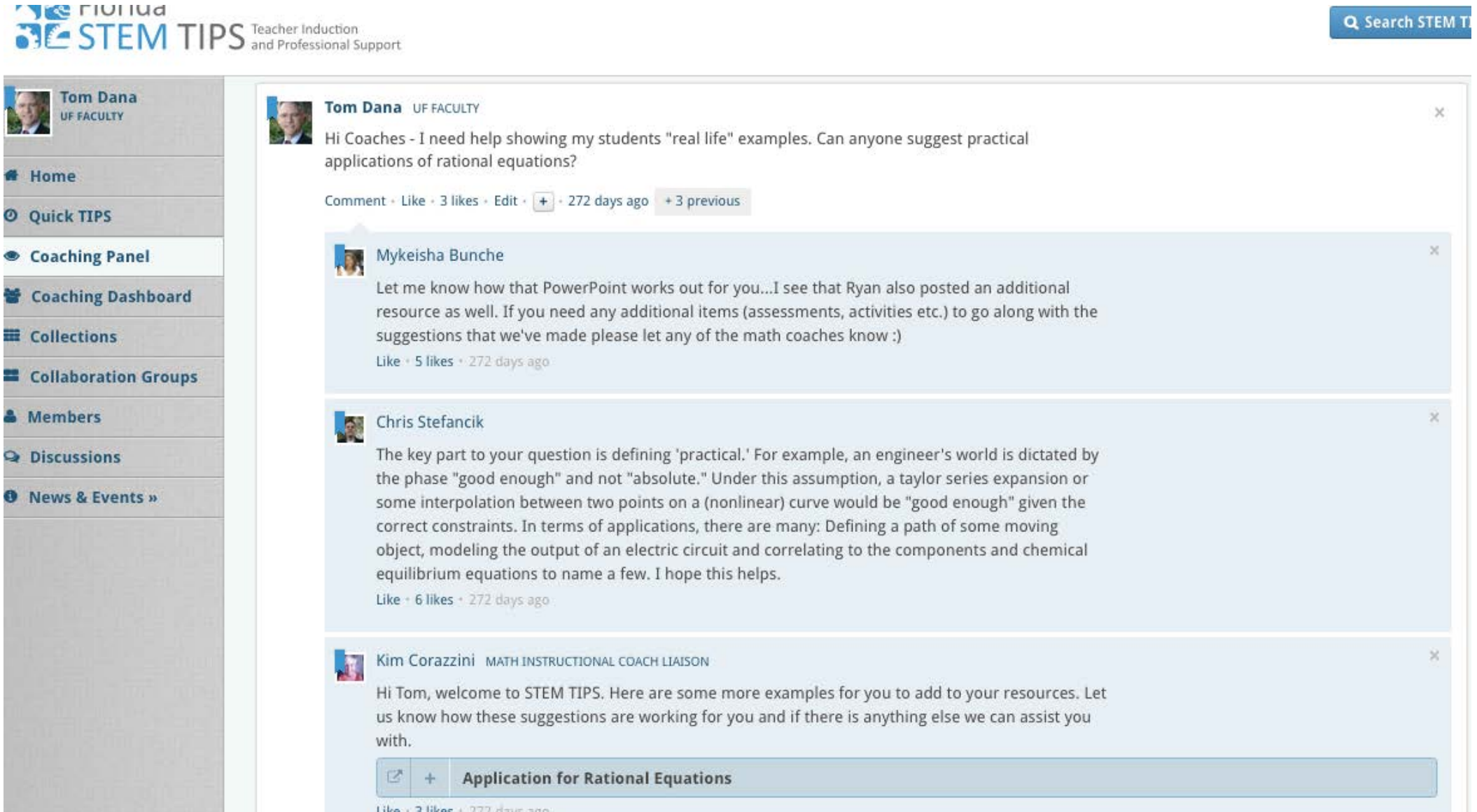


Layer #3: Private, Personalized Induction Coaching



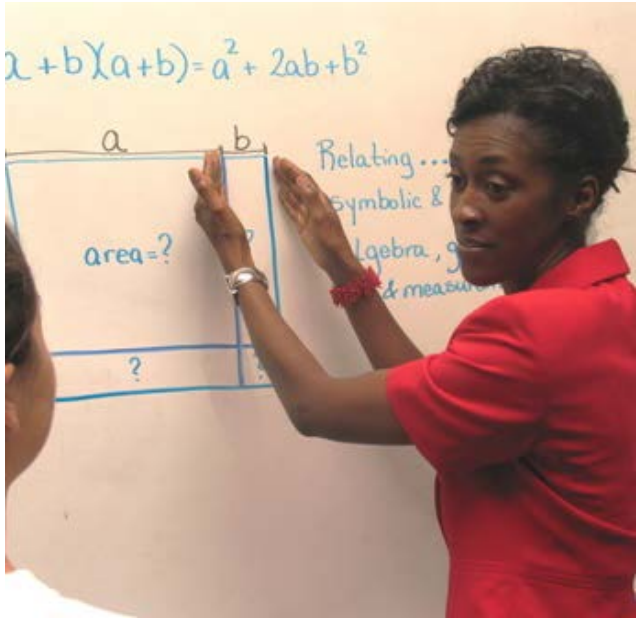
- **Coaches** can be accessed individually, as a small group, or as a whole panel
- **Discussions are confidential** to the mentee and (1) all coaches, (2) small coaching groups, or (3) individual coaches.
- **STEM TIPS Specialists available** for consultation to coaches mentoring outside their content area.

Private, Personalized Instructional Coaching



Layer #3 Includes Private Remote Video Coaching

Results



Platform Use

- …active during 1.5 years of teaching
- …use drops off at 2 years
- …use stable with voluntary mentors

New Teachers Report

- …satisfaction in having access to a support system of coaches and peers
- …improvement in general teaching strategies and classroom management skills
- …strong positive ratings for being a part of a community of new STEM techers

In Their Words…

- *"I think that the quick coaching response is the most useful thing to first year teachers. I use this site to communicate with other teachers throughout the state and for the many resources the site offers."*
  - **Jonathan Gaskins, 9th grade mathematics teacher**
- *"The coaching page is great to get immediate feedback for planning your lessons. I like being able to hear from other teachers and see what they have to offer about what works in their classroom."*
  - **Loni Hodges, 7th grade Life Sciences teacher**
- *"Having support, encouragement, helpful insight, and just knowing that someone else is there to help with what I may encounter is the most important part of the STEM TIPS program to me."*
  - **Robert Lambright, High School mathematics teacher**

School Administrator Testimonial

- *"The STEM TIPs Coaches and web-based resources have been valuable assets for the our novice teachers. Many of our new math and science teachers did not enter the field of teaching through traditional routes. Although they bring content knowledge and relevant experience they need assistance with planning and managing instruction. We have integrated STEM TIPS into our induction program by requiring interaction with the coaches. The coaches provide one-on-one virtual assistance with planning and post-lesson debriefing. Their "24/7" availability provides a level of support that the teachers would not otherwise receive."*

Dr. Lissa Dunn Supervisor,
Mentoring and Induction Program for Novice Teachers
Duval County Public Schools

What about Retention as STEM Teachers?

- Nearly 80% of original cohort persists into 2nd year of teaching
- Lost only 3% additional in 3rd year (preliminary)
- Monitoring first cohort who are now entering 4th year.
- Use data analysis beginning

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THANKS

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Florida STEM TIPS Teacher Induction and Professional Support

http://stemtips.education.ufl.edu