STEM 360 – Growing Opportunities in Changing Environments
2021 Summer Institute
Presentations

Presentation: How to get Students to Publish in a Peer-reviewed Journal

The International Journal of High School Research (IJHSR) is a publication of Terra Science and Education, a 501.c.3. nonprofit organization and has been published since 2019.

It provides a platform for high school students who are involved in research to learn publication about the publication process and to become a published author.

IJHSR is a peer-reviewed by university faculty members, STEM experts, postdoctoral researchers, and doctoral students. Four issues are published each year with selections from a variety of student work in all areas of science, including the behavioral and social sciences, technology, engineering, and math.

We will go over the process that students and teachers can use to publish their work in IJHSR.

Target Audiences: Senior Grades (9-12)

Disciplinary Connections: Science, Technology, Engineering, Math

Beal, Rick, Terra Science and Education
Fehmi Damkaci Terra Science and Education

Presentation: Implementing the New York Computer Science and Digital Fluency Standards

In December of 2020, the Board of Regents approved the NYS Computer Science & Digital Fluency Standards for grades K-12. Join this session to learn more about the standards, including the path to the standards approval, 5 key concept areas, the progression of these concepts across grade bands, the rollout timeline, and ideas and strategies for implementation.

The new standards are to be implemented in all content areas, yielding great opportunity to establish rich connections between disciplines, helping our students better understand important connections between their learning, their world, and future careers.

Target Audiences: Primary Grades (PK-4), Intermediate Grades (5-8), Senior Grades (9-12), All audiences

Disciplinary Connections: Science, Technology, Engineering, Math, ELA, The Arts

Blank, Lisa, Watertown City School District, STEM Learning Ecosystems- North Country STEM Learning Network
Amanda Zullo- J.W. Leary Junior HIgh School, Massena
Mary Margaret Small- Clarkson University, STEM Learning Ecosystems- North Country STEM Learning Network

Presentation: Fits Like a Glove! Computer Science and Digital Fluency Standards in Core Instruction

Join this session to learn more about the "fit" of New York State Computer Science and Digital Fluency Standards into core instruction K-12. This session will provide an overview of the standards structure, including the five key concept areas, relevant sub-concepts, and grade bands.

The presenters have been actively engaged with educators from across the state in the curation of resources to help educators with standards implementation. The team will share a variety of tools, strategies, and resources that have been gathered to support rich integration of the standards across content areas and grade bands.

The presentation team will also address how many of the standards, particularly those involving cybersecurity and digital fluency, are not just useful, but rather essential in equipping our students. beginning in the earliest grades, with core knowledge and habits of practice essential for operating safely in the digital world.

Target Audiences: Primary Grades (PK-4), Intermediate Grades (5-8), Senior Grades (9-12), All audiences
Disciplinary Connections: Science, Technology, Engineering, Math, ELA, The Arts
Blank, Lisa, Director of STEM Programs, Watertown City School District/ North Country STEM Learning Network
Cameron Fadjo, Assistant Superintendent Pleasantville Schools
Gerald Ardito, Computer Science Education, Manhattanville College of Education
Laurie Yager, Instructional Computing Specialist, Madison-Oneida Regional Information Center, NYSCATE Board of Directors

Presentation: MathWhiteboard - a collaborative whiteboard for Math teaching and learning

MathWhiteboard is the first online collaborative whiteboard designed specifically for the teaching and learning of Mathematics. MathWhiteboard is like a smart piece of math paper with all of the functionality of a graphing calculator. Since it recognizes handwritten math notation, teachers and students can interact in a natural and familiar way. A gestural user interface allows users to move fluidly between multiple mathematical representations. The development of MathWhiteboard has been supported in part by the National Science Foundation, National Institutes of Health, and US Department of Education.

Target Audiences: Intermediate Grades (5-8), Senior Grades (9-12), College (13-16)
Disciplinary Connections: Science, Technology, Engineering, Math
Carney, Donald, MathWhiteboard

Presentation: Math Applications to Real Life Architectural Engineering problems

Examples of Solving practical and real life problems in architectural Engineering using basic math equations and concepts

Target Audiences: Senior Grades (9-12), College (13-16)
Disciplinary Connections: Technology, Engineering, Math
Chiffert, Marc , Chiffert Architectural Engineering

Presentation: A Case Study in Project Management: Leveraging Civic Engagement to Simulate Professional Practice in the Classroom

For the past two years, students in ARCH 8003 – Professional Practice at Alfred State College have organized themselves into project teams to undertake an off-campus civic engagement project in association with the Southern Tier Architectural Resource Center. Each year, Project Managers have stepped forward to oversee a project team and project, with each team consisting of three hypothetical architectural staff and two recent college graduates. Professor William C. Dean, RA, AIA has acted as firm Principle (P) for each team, and communicated directly with each Project Manager (PM). It is expected that the PM's share information with their project teams as necessary, allowing Professor Dean to focus on marketing and firm development.

The purpose of this presentation will be to discuss this case study in project management in terms of challenges that were encountered, opportunities for student engagement and leadership, and the feasibility for sustainable community development resulting from such a project. Student work including examples of project coordination matrices, schedules, and budget and compensation plans will be presented along with drawings, specifications and cost estimates for each project.

Target Audiences: College (13-16)
Disciplinary Connections: Technology, The Arts
Dean, William, Alfred State - SUNY College of Technology

Presentation: Solving elastic collision without a KE postulate

The case of inelastic collisions has a simple solution, but elastic collisions introduce an additional unknown and require additional assumptions. Conservation of kinetic energy is the usual choice, but an approach using more self-evident assumptions is available. The problem can then be cast entirely in a Newtonian framework without resort to convenient but cognitively weak postulates such as off-the-shelf formulae regarding energy conservation.

Target Audiences: Intermediate Grades (5-8), Senior Grades (9-12), College (13-16)
Disciplinary Connections: Science, Math
Duveen, Peter, Museum of Brooklyn Art and Culture

Presentation: BREAKOUT: Putting Productive Struggle to Work with Escape-Box Learning

Did you ever notice that your kids will try hundreds of times to "beat the boss level" of a video game, but give up on a challenging math problem with their first mistake? There is nothing like the lure of a locked box to push kids to work through their frustration, cooperate with each other, and be innovative thinkers. I use both physical breakout boxes and digital breakouts across age level and content areas. Come learn more, and try one out targeted for your target age level. I will demonstrate how to build a physical kit, and then split participants into small groups to try a digital challenge together in their content area and grade level of choice.

Target Audiences: All audiences
Disciplinary Connections: Science, Technology, Engineering, Math, ELA, The Arts
Elder, Kate, Cobleskill-Richmondville Central School

Presentation: Fixing Disruptions – Creating a Calm Classroom (K-12)

Disruptive students dominate your attention, time and patience. Imagine speaking to your troublesome student(s) just once, ending the issue, then you're back to teaching. Learn research-based, time-tested teaching strategies proven to WORK the very next time you step into the classroom, no matter the content area.

Discover teaching techniques covering:

1. How to remain calm and in-control
2. How to stop the repeated requests and multiple warnings, when asking students to behave
3. The HOW and WHEN to effectively engage with your disruptive troublesome student(s)
4. How to professionally handle and diffuse "blurted-out comments" that interrupt and stop the teaching process
5. How to successfully cover 30% or more curriculum every year by eradicating lost valuable teaching time
6. How to arrange your classroom layout to enhance your teaching style while helping to impede and stop off-task student behaviors

The results - decreased discipline issues / increased academic performance / a healthy, calmer, more productive culture for learning in your classroom. Every teacher knows, classroom disruptions ARE GOING TO HAPPEN, the question is.... How will you react?

Target Audiences: Primary Grades (PK-4), Intermediate Grades (5-8), Senior Grades (9-12)
Disciplinary Connections: Science, Technology, Engineering, Math, ELA, The Arts
Frongillo, David, Retired Educator

Presentation: Supporting Equity in the Classroom (K-12)

NOT every student learns the same way or at the same pace, because - no two students are exactly alike. Differentiated Instruction addresses Learning Styles and Multiple Intelligences, making content relatable, and learnable, with a higher rate of retention. Discover research-based techniques and methods of communication proven to benefit over 70% of ALL students. Experience the following during this session:

- Various ways to present content materials at different levels (parallel tasks or tiering)
- Unique ways to engage and motivate students, using -- movement, visual techniques, human graphing, and storytelling
- Randomization -- keeping students engaged and "on-their-toes" using dynamic tension.
- Formative assessment ideas for obtaining immediate student feedback. Allowing teachers to modify their presentation methods almost immediately, if needed.
- Fun, new ways to introduce new materials that engage and challenge the students

The results - INCREASE – academic performance and student engagement, as student frustration and failures – DECREASE. When the teachers are having fun teaching, then the students will be having fun learning. When learning is fun, Everybody WINS!

Target Audiences: Primary Grades (PK-4), Intermediate Grades (5-8), Senior Grades (9-12)
Disciplinary Connections: Science, Technology, Engineering, Math, ELA, The Arts
Frongillo, David, Retired Educator / Certified National Trainer

Presentation: Supercharging science learning with real online labs

Science labs are both the most important and most challenging part of teaching science. I know well since I was a high school science teacher for some years. Poor quality science labs fail to get students to love science or excel at it. We are removing this challenge with an accessible, affordable solution that keeps students accountable and doing science the right way - real online science labs. Join me to learn how online science labs are used, how they can replace hands on labs in this challenging time, and the improved learning outcomes you can expect when using online labs. Our solution will show you how student do inquiry style labs, test hypotheses, measure real data, and write lab reports all online in hundreds of labs topics. I look forward to meeting all of you, Edward

Target Audiences: Intermediate Grades (5-8), Senior Grades (9-12), College (13-16)
Disciplinary Connections: Science, ELA
Keller, Edward, Smart Science Education

Presentation: Teaching Students the Skill of Computational Thinking

Within the next few years, Computational Thinking will be one of the New York State standards — be ready! Join us for a hands-on, exciting presentation about Computational Thinking — a skill necessary not just for the classroom but for life! How do we teach children to think critically and solve problems on their own? This is not simply a Technology, Coding or Mathematics issue — we need to teach students to be computational thinkers so they can learn how to identify any problem and consider ways to break it down into small, manageable steps to solve.

Participate in an open discussion that will describe ways to help your students learn to be better Computational Thinkers. We'll talk about decomposition, pattern recognition, abstraction, and algorithms. As we discuss the different steps and strategies, you'll have the opportunity to work through and discuss a range of challenging and engaging activities. Resource suggestions will be provided.

Target Audiences: Primary Grades (PK-4), Intermediate Grades (5-8)
Disciplinary Connections: Technology, Math
Kling, Jennifer , Souderton Area School District, Pennsylvania
Robert Sun

Presentation: Creating a STEM Classroom with Texas Instruments

In this session, we will explore the endless STEM possibilities with TI graphing calculators. Code in TI-Basic or Python with the latest classroom solutions. Take the TI-Innovator Rover robotic car for a test drive and map your pathway towards STEM careers.

Target Audiences: Intermediate Grades (5-8), Senior Grades (9-12)
Disciplinary Connections: Science, Technology, Engineering, Math
Morse, Dana, Texas Instruments Inc

Presentation: Integrating Social Justice, Data Science, and Biology in the Classroom

This presentation will demonstrate a classroom activity to investigate patterns of modern chronic health conditions and historic redlining in US cities. The activity allows students to learn about systemic racism using an exploratory rather than a didactic approach and with quantitative data. Students also consider the opportunities that data science provides to answer new questions in new ways, especially with respect to georeferenced data. Participants in this workshop are encouraged to minimize their virtual presentation window while they experience the activity as students. Credit to Tamara Basham and Pat Marsteller for leading the Social Justice and Community Change Faculty Mentoring Network through the Quantitative Undergraduate Biology Education and Synthesis (QUBES) and BioQUEST Curriculum Consortium (BQCC) network, where this activity was developed and where additional activities are available.

Target Audiences: Intermediate Grades (5-8), Senior Grades (9-12), College (13-16), Industries

Disciplinary Connections: Science, Technology, Math, ELA, The Arts

Mulcahy, Mary, University of Pittsburgh at Bradford

Presentation: Purple Team approach to the Dark Web

TBD

Target Audiences: Senior Grades (9-12), College (13-16)

Disciplinary Connections: Technology, Engineering

Mulford, Samantha , NYS - Educator K-12

Jarrett Heintz - DWC Instructor/Presenter

Ross Everett - DWC Instructor/Presenter

Presentation: VEX Robotics the K-12 solution

VEX Robotics is educational robotics for everyone. VEX solutions span all levels of both formal and informal education with accessible, scalable, and affordable solutions. Beyond science and engineering principles, VEX encourages creativity, teamwork, leadership, and problem solving among groups. It allows educators of all types to engage and inspire the STEM problem solvers of tomorrow!

Target Audiences: Primary Grades (PK-4), Intermediate Grades (5-8), Senior Grades (9-12)

Disciplinary Connections: Science, Technology, Engineering, Math, ELA, The Arts

Read, Scott, iDESIGN Solutions- vendor

Presentation: Using Student-Driven Experiences to Build Understanding

Why do we ask teachers to use hands-on, interactive techniques in the classroom? Because they tap into the natural human instinct to learn through experience. Gaming is a powerful medium that creates excitement, generates engagement and builds confidence.

The session focuses on integrating science and math concepts (like connecting the ways plants and animals can impact the environment with interpreting products and quotients of whole numbers) by using game-based learning, a collaborative discussion among teachers to build lesson plans incorporating games that tie in science and math which align to NYS standards and benchmarks and improve student achievement, and a variety of suggestions on how to implement game-based learning within a larger NYS curriculum. And, of course, it will be interactive as all participants will have a chance to play some fun educational videos games!

Attendees will have the opportunity to discuss how they use game-based learning in their district, the benefits game-based learning can provide like making the connection between science and math, and how they could see implementing this innovative teaching strategy into the classroom. Come ready to collaborate, compete, learn some fun science (and math) through game play and have a whole lot of fun!

Target Audiences: Primary Grades (PK-4), Intermediate Grades (5-8)
Disciplinary Connections: Science, Math
Reidy, Sean, Legends of Learning

Presentation: Quantum Computers-What Does It Mean for Education?

STEM (Science Technology Engineering and Math) is an important part of today's education system. It is trying to prepare our young minds for their work in the job force. However, technology is constantly progressing and changing. Computers and networking are on a doorstep of a major change. Quantum computers are that change. Those machines will take our current world of true and false to a world of true, false, and a definite maybe. When that technology goes mainstream everyone that currently works in computer science, computer programming, networking and cybersecurity will have to change with the advancement. What exactly are quantum computers? Where are we in the stream of time bringing quantum computers to everyone? What does everyone need to know to take advantage of those computers? More importantly, how can we prepare our students for the world of quantum computers? This paper will research those questions and more on this subject.

Target Audiences: Senior Grades (9-12), College (13-16)
Disciplinary Connections: Science, Technology, Math, ELA
Rittenhouse, Russell, Alfred State College

Presentation: Digital Notetaking to Increase Online Engagement

Through the pandemic, I had to work with students both in person and online at the same time. I utilized Nearpod, Quizizz, and Desmos as a tool to navigate both in-person and online learning of math topics. Learn how websites like Nearpod, Quizizz, and Desmos allow educators to see multiple students working at one time.

Target Audiences: Primary Grades (PK-4), Intermediate Grades (5-8), Senior Grades (9-12), College (13-16), Industries, All audiences
Disciplinary Connections: Technology, Math, ELA
Schaefer, Stephanie, Seton Catholic Central

Presentation: Empowering K-12 students by leveraging Computational Thinking into the mathematics curriculum

In this presentation, we share examples of computational thinking and modelling practices from a summer camp designed for underrepresented youths and a university differential equations course. These examples provide STEM learning experiences through robotic activities, Scratch, Lego Mindstorms, and computational modelling using SageMath coding. In the breakout rooms and through hands-on instructional approaches we demonstrate live examples for student interaction and activities. The exemplars can be adjusted and utilized to investigate different socio-scientific issues, other applications, and other grades.

Through our studies, we have found that within the mathematics and problem-solving context students were largely successful in recognizing the dynamic nature of mathematics, the patterns, modelling the problems and optimizing their solutions through 'collaborative engagement' activities (Sedaghatjou, Rodney, 2018). Additionally, we note that the findings can be extended to both informal and in-school contexts.

Target Audiences: Intermediate Grades (5-8), Senior Grades (9-12), College (13-16)
Disciplinary Connections: Science, Technology, Engineering, Math
Sedaghatjou, Mina, Alfred University
Amanda Lipnicki

Presentation: Tech Tools for Purposefully Connecting SEL, STEAM, and MakerEd

SEL, STEAM, and MakerEd are naturally interconnected and can foster worthwhile learning experiences. These systemic elements are regularly used in project-based, experiential, inquiry-based, and service learning, but often without a noticeable purpose. However, when they are purposefully united and intentionally integrated in projects with societal significance, learning outcomes expand beyond the "3R's" and "4 C's". COVID-19 caused a major disruption in learning, forced a greater infusion of EdTech, and emphasized the critical need for tech-embracing pedagogy. To revive teachers' ability to design and maintain the culture of learning that motivated them and inspire their students, we propose to utilize the innovative power of STEAM and MakerEd tech tools. As a concentration of creativity in material form, they can be a vehicle to deliver engaging content, create a trustful classroom atmosphere, and instill the key students' skills to be successful in a competitive global workforce, i.e., these tools can support uniting SEL, STEAM and MakerEd mindset into one powerful system. In this presentation we will analyze the building blocks of this system, explore the role of tech tools as its catalyst, share a blueprint of its implementation, and illustrate its success with positive classroom cases.

Target Audiences: Primary Grades (PK-4), Intermediate Grades (5-8)
Disciplinary Connections: Science, Technology, Engineering, Math, ELA, The Arts
Tuule, Irina, Eduporium

Presentation: Bring STEAM & Coding to life with SAM Labs!

This session will allow you to gain confidence in implementing STEAM and Coding with your K-8 students. Our hands-on approach models our flow-based coding to block-based coding so students can solve problems in a real-world context using our wireless physical and virtual blocks. Using our web-based SAM Studio platform, you will have the opportunity to create coded systems in both platforms, as well as visit our Content Hub featuring standards-aligned lesson plans and resources for you to explore!

Target Audiences: Primary Grades (PK-4), Intermediate Grades (5-8)

Disciplinary Connections: Science, Technology, Engineering, Math, ELA, The Arts

Waring, Ashley, SAM Labs

Mackenzie Meizner

Presentation: Using LED's to Explore Electricity

The best STEM learning practices include phenomena that engage learners and allow for the exploration of real-world, everyday experiences. Traditionally, batteries bulbs and wires are used to teach concepts in electricity. This workshop will incorporate observations of LEDs and explore models of how LEDs are constructed and operate. Participants will work with various colored LEDs and coin cells.

Target Audiences: Intermediate Grades (5-8), Senior Grades (9-12)

Disciplinary Connections: Science, Technology, Math, ELA, The Arts

Zawicki, Joseph, SUNY Buffalo State, STANYS, NYSSEC, WNY STEM Hub

Presentation: Teacher Generated Questions, Learner Generated Models

Best teaching practices support the exploration of phenomena and the development of student models for the operation of that phenomena. This workshop will explore teacher questioning approaches and their impact on eliciting testable student models.

Target Audiences: Primary Grades (PK-4), Intermediate Grades (5-8), Senior Grades (9-12)

Disciplinary Connections: Science, Math, ELA

Zawicki, Joseph, SUNY Buffalo State, STANYS, NYSSEC, WNY STEM Hub