National Science Foundation Grant Writing Workshop

Tuesday May 19, 2020

KENT STATE UNIVERSITY

Outline of workshop

- General overview of NSF (Lique Coolen)
- Research Funding : Mary Ann Raghanti
- Liasions with Industry : Torsten Hegmann
- Educational Research : Rick Ferdig
- ORCID ID and ScIEncV : Michael Hawkins

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Overview:
National Science Foundation

Presented by Lique M. Coolen, Ph.D.
Associate Dean of Faculty Research Development
College of Arts and Sciences
Professor Biological Sciences

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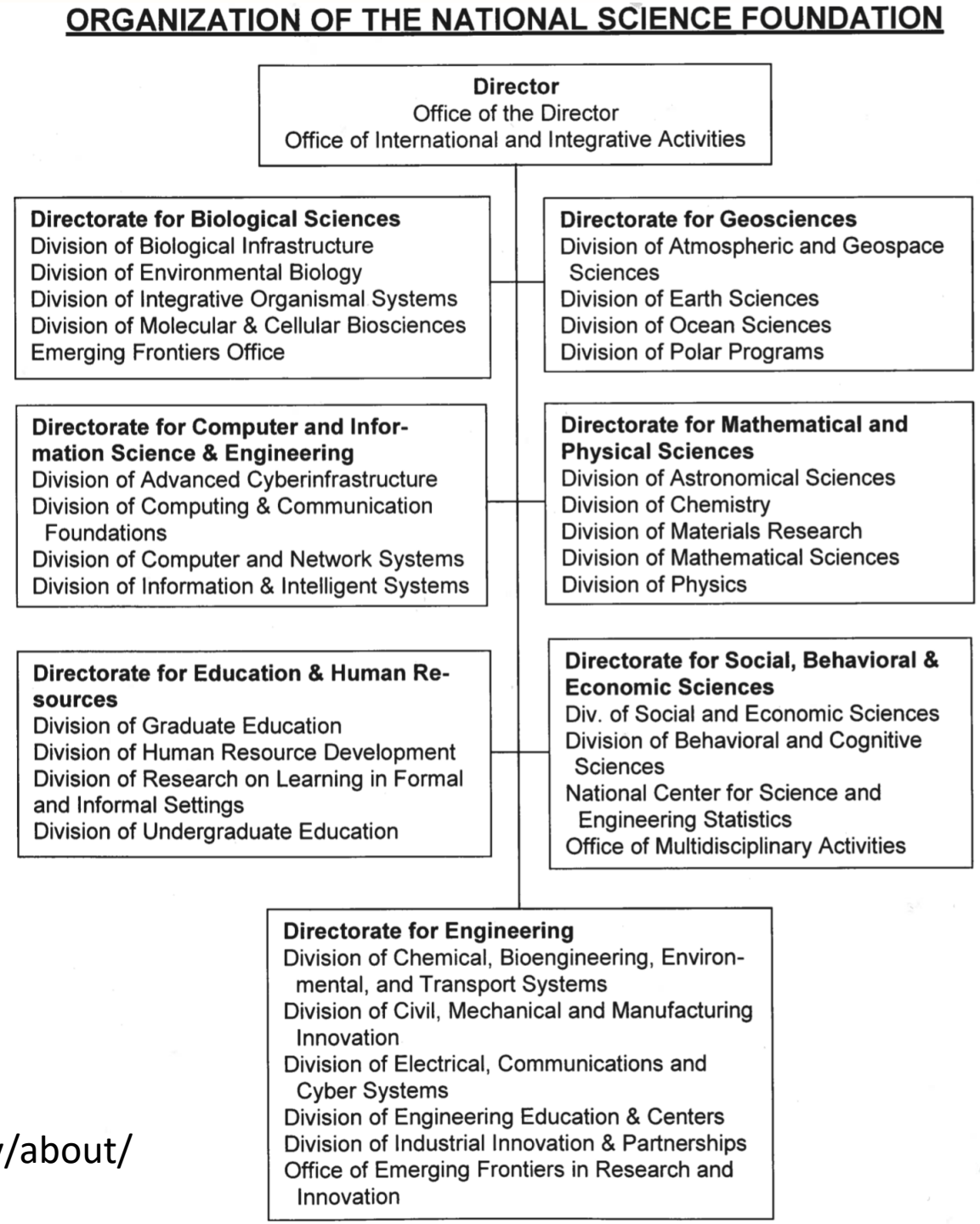
NSF Mission

- Expand knowledge in science, engineering, and learning: Promote the progress of research
- Support for all fields in of fundamental science and engineering
- It aims to advance knowledge through investments in ideas, people, and infrastructure, and to advance the practice of research
- “And in every case, we ensure that research is fully integrated with education so that today's revolutionary work will also be training tomorrow's top scientists and engineers”.



https://www.nsf.gov/about/

NSF Funding Opportunities

A-Z Index

Use the A-Z Index to find funding opportunities by title.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Research Areas

- Biological Sciences
- Computer and Information Science and Engineering
- Crosscutting and NSF-wide
- Education and Human Resources
- Engineering
- Environmental Research and Education
- Geosciences
- Integrative Activities
- International Science and Engineering
- Mathematical and Physical Sciences
- Social, Behavioral and Economic Sciences

Special Programs

- Broadening Participation
- For Graduate Students
- For K-12 Educators
- For Postdoctoral Fellows
- For Undergraduate Students
- For Veterans
- For Small Business Programs

https://www.nsf.gov/funding/index.jsp

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Broadening Participation

- NSF's commitment to broadening participation is embedded in its Strategic Plan through a variety of investment priorities, including:
- Preparing a diverse, globally engaged science, technology, engineering, and mathematics (STEM) workforce;
- Integrating research with education, and building capacity;
- Expanding efforts to broaden participation from underrepresented groups and diverse institutions across all geographical regions in all NSF activities; and
- Improving processes to recruit and select highly qualified reviewers and panelists.
- Guided by the Strategic Plan, NSF established a performance area focused on broadening participation: **to expand efforts to increase participation from underrepresented groups and diverse institutions throughout the United States in all NSF activities and programs**.

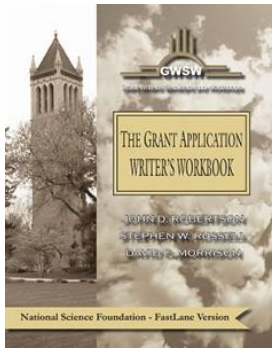
https://www.nsf.gov/od/broadeningparticipation/bp.jsp

Proposal Development and Submission Support

- **For pre-submission proposal development:**
  - Contact:
  - Lique Coolen at jcoolen@kent.edu

- **For proposal submission:**
  - Contact:
  - Diana Skok at dskok@kent.edu

- **Recommended resource: Grant Application Writer's Workbook:**
  - http://www.grantcentral.com/workbooks/national-science-foundation/



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Speakers

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Lique Coolen

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NSF RESEARCH PROPOSALS

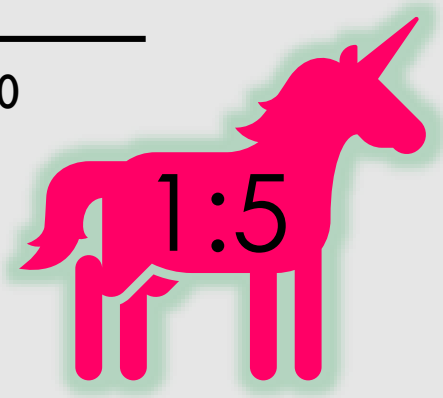
Mary Ann Raghanti, Ph.D.
Professor and Chair
Department of Anthropology

External research support

◦ NIH 3U42OD011197-19S1 (subaward from MD Anderson to Raghanti, PI, KSU)	2019-20	$211,925.00
◦ NSF IRES (PI Anthony Tosi, co-PIs Raghanti, Meindl, Lovejoy)	2019-22	$298,686.00
◦ NSF BCS-1846201 (PI Raghanti)	2019-22	$309,999.00
◦ NIH R01ES029344 (subaward to Edler, Raghanti from FIU)	2019-20	$143,624.00
◦ NSF BCS-1316829 (PI Raghanti)	2013-17	$225,615.00
◦ NSF BCS-0921079 (PI Raghanti)	2009-13	$289,872.00
◦ IMLS MA-06-08-0349-08 (PI Dennis, co-I Raghanti)	2008-10	$142,666.00
◦ Morris Animal Foundation (PI Dennis, co-Is Raghanti, Vick, Wolfe, Wildt)	2008	$51,000.00
◦ Morris Animal Foundation (PI Dennis, co-Is Raghanti, Brown)	2007	$8,066.00
◦ Sigma Xi Grants-in-Aid (PI Raghanti)	2001	~$400.00
		$1,681,853.00

External research support to for students

◦ NSF EAPSI to graduate student Danielle Jones	2017
◦ NSF EAPSI to graduate student Emily Munger	2015
◦ Sigma Xi Grants-in-Aid to graduate student Melissa Edler	2014

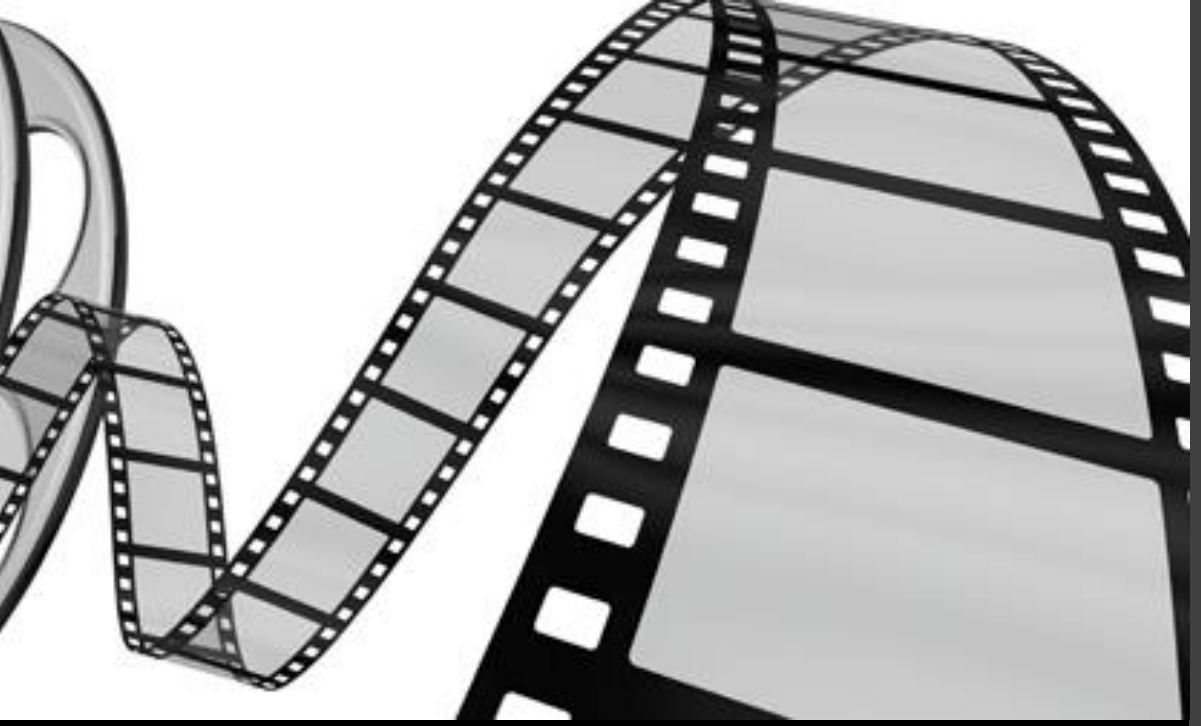


Your NSF Program Officer

- Identify programs that fit your research
- Email Program Officer – ask for an appointment for a phone conversation
  - Does your research idea fit the program?
  - Identify typical funding ranges for funded proposals in that program
  - Discuss Broader Impacts- propose some options that you would like to include
  - Ask about typical pitfalls and successes

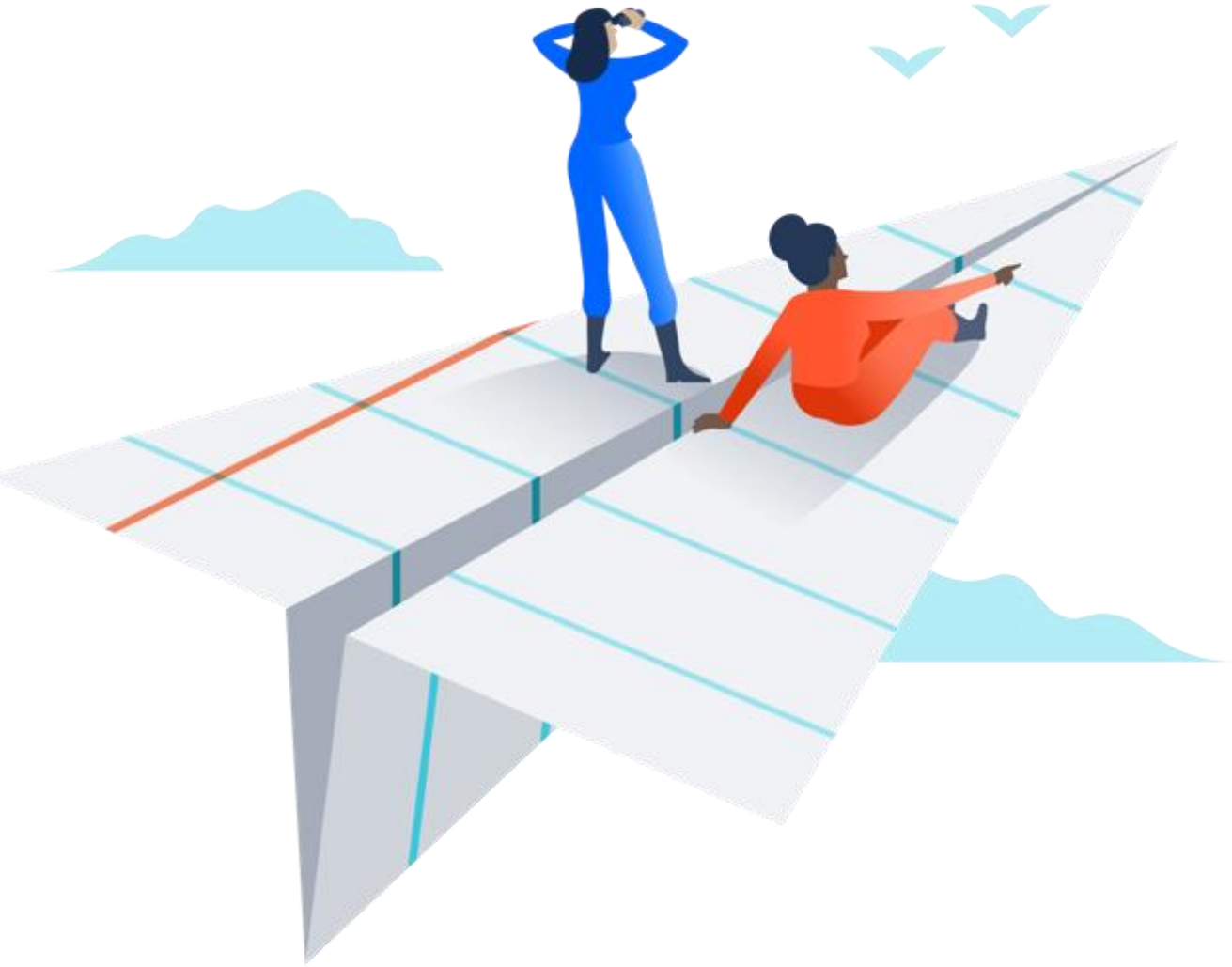
A WINNING FORMULA

- One-page Project Summary
- Project Description
- Reviewer feedback



One-page Project Summary

- NOT an afterthought
- Should be the highlight reel
- Overview, Intellectual Merit, Broader Impacts



Project Summary: OVERVIEW

- Two sentences of general background to put your research in context
- One sentence that summarizes your overarching question – big picture view
- A few sentences delving into why your research question is a good one
- Two concluding sentences outlining how you will address the question (what you will look at, what methods you will use)

Project Summary: INTELLECTUAL MERIT

- Start by stating what the results of your research will provide.
- Explain why your data will be valuable- these data currently don't exist, but once we have these data we will be able to understand x, y, and z. This will inform a, b, and c.
- State how your research fits this program.
- These results will be important to understand x within field y.
- Detail how your results will impact/could influence your discipline and other disciplines. Provide examples- be specific.
- If your results could be transformative, state this and explain how.

Project Summary: BROADER IMPACTS

- This project will generate data- what are the data, how will they be available to other researchers?
- How will this project impact students at KSU (and beyond)?
- How will students participate in research?
- Can you recruit from underrepresented groups? Do you have an established record of this in your lab?
- Is your work interdisciplinary, collaborative?
- Is funding requested to support students?
- How can you engage underrepresented groups, community groups, etc.?

PROJECT DESCRIPTION 15 pages

- **INTRODUCTION**
  - 1-2 pages to set up your question
  - Broad strokes- One of the most compelling questions in field x is y……

STATE THE RESEARCH OBJECTIVES & SPECIFIC HYPOTHESES

- First state the **central question** that ties everything together, then:
- Objective 1
  - Hypothesis 1
  - Hypothesis 2
- Objective 2
  - Hypothesis 1
  - Hypothesis 2
  - Hypothesis 3
- Objective 3
  - Hypothesis 1
  - Hypothesis 2

BACKGROUND

- Provide the background for the project- this is where you go into some detail- demonstrate your knowledge of the topic
- Use subheadings to clearly organize the content

RESEARCH DESIGN AND METHODS

- Link all of the data that will be gathered to the Objectives and Hypotheses [be specific- even add the following to the end of a section: (**Objective 2, Hypothesis 1**)]. Never assume your reviewer will connect dots- make it easy for them to see the connections.
- Use appropriate subheadings (e.g., study sample, sample justification & power analysis, sample processing, data acquisition, preliminary data, statistical analyses).
- Use tables and figures to simplify things (and save space)
- Statistical Analysis section – explicitly link the analyses to objectives and hypotheses again. End sentences/sections with (**Objective x, Hypothesis y**).

Summary

- Paragraph 1: The present proposal aims to…. (fill in the blank). Then re-phrase the central question in one pithy sentence. State your expectations in one or two sentences.
- Paragraph 2: To understand compelling big question x, we need to know y. This research will provide y, which will get us closer to x.
- This should be compelling- your reader should WANT to know the answer to your question.

TIMELINE

Break it up by year or other big chunk of time. Can be in broad strokes, but must be reasonable. Can be a table.

INTELLECTUAL MERIT

- MUST have this subheading.
- How does this build upon what you've already done?
- How will your results contribute to the field represented by this NSF program? Can you tie it into the mission of that specific program or other NSF programs?
- How will your results impact or inform other fields?

BROADER IMPACTS (1 page)

- MUST have this subheading
- I include the following subheadings under Broader Impacts and address each one:
  - Advancing discovery & understanding while promoting teaching, training, and learning (student participation in research)
  - Broaden participation of underrepresented groups
  - Broaden dissemination to enhance scientific understanding (in addition to traditional publications, presentations, provide outreach- community, public lectures, and/or via news agencies, social media).
  - Benefits to society (data that can be archived, results that inform other disciplines, questions).

WHO SHOULD BE A SUGGESTED REVIEWER?

People who cite you!

People who are experts who you don’t know and have not met.

What do reviewers say?

- Statistical power – power analyses
- Broader impacts – this bar keeps moving – higher and higher
- Explicitly link data and data analyses to hypotheses
- Provide alternative explanations – if your hypothesis is not supported, what would it mean?
- AVOID objectives that hinge on each other. If Objective 1 fails, can Objectives 2 and 3 stand on their own?
- Provide future directions to show the utility of the data that you will generate (these do not need to be something that YOU would or even could do…)

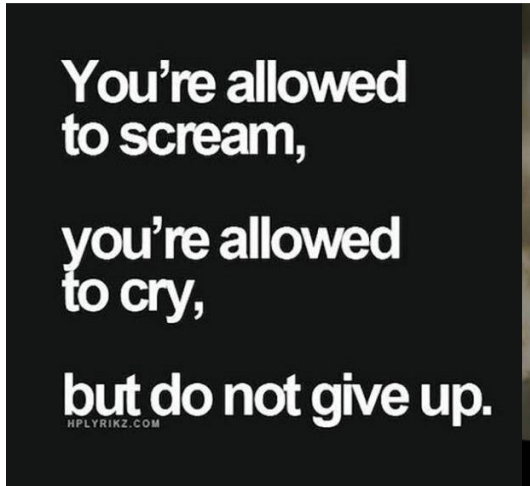
WHEN YOU GET REJECTED….

REVISE

- Set up a time to talk with your Program Officer.
- Establish a revision plan and outline this plan to your PO.
- Take the conversation slow- have questions written down to keep the conversation going.
- Response to reviewers in proposal.
- Re-submit for the next deadline.

"You're a fighter. Look at everything you've overcome. Don't give up now."

— Olivia Benson



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Liaisons with Industry
Torsten Hegmann, Director (AMLCI)

NSF Programs (led or participated in…)

- Division of Materials Research DMR (SSMC, CMP and MRI; Solid State and Materials Chemistry, Condensed Matter Physics, and Major Research Instrumentation)
- Division of Chemistry CHE (REU; Research Experience for Undergraduate)
- Division of Electrical, Communications and Cyber Systems ECCS (EPMD, CCSS, GOALI; Electronic, Photonic & Magnetic Devices and Communications, Circuits and Sensor Systems)
- Participated in DMR-MRSEC (Materials Research Science and Engineering Center), DMR-STC (Science and Technology Center)

NSF Programs (liaison w/ industry)

- GOALI – Grant Opportunities for Academic Liaisons with Industry
- PFI – Partnership for Innovation – RP track – Research Partnership
- IIP – Industrial Innovation and Partnership – includes PFI, I-Corps (innovation CORPS program), INTERN (internships), IUCRC (industry-university cooperative research centers), SBIR (small business innovation research), and STTR (small business technology transfer)

NSF Program (GOALI)

- Established, interactive, working relationship with an industry partner
- IP and Materials Transfer Agreements need to be in place and provided during submission – this needs to be negotiated with the University and the industry partner
- There is a special project Proposal Form prior to the 15-page research description

NSF Program (GOALI)

- Proposal needs to clearly delineate:
  - why partnership is essential (nature of partnership)
  - Industry Co-PI (but NSF does not provide funds to industry partner)
  - What is industry partner contributing to the project (beyond materials)
- What is your path to commercialization
- Milestones and Deliverables need to be spelled our clearly

NSF Program (GOALI)

- Discussions with program officers upfront and early in the process – you need to know if the program encourages GOALI proposal
- Interactions with industry partner are part of the reporting structure
- Next steps:
  - PFI-RP track (specific partner for new commercialization ideas)
  - SBIR, STTR (start-ups)
  - IUCRC (center)

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Effective
Educational
Technologies
Rick Ferdig, Ph.D.
RCET; EHHS
http://www.ferdig.com

Education and Human Resources (EHR)

- Education and Human Resources (EHR) Home
  - About
  - Programs
  - Staff
  - Funding
  - Awards
  - News
  - Events
  - Additional Resources
- Graduate Education (DGE)
- Research on Learning in Formal and Informal Settings (DRL)
- Undergraduate Education (DUE)
- Human Resource Development (HRD)

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Programs: Directorate for Education and Human Resources (EHR)

This is a list of all the programs within the Directorate for Education and Human Resources (EHR).

Key: C Crosscutting | N NSF-wide

Division of Graduate Education (DGE)

- Accelerating Discovery: Educating the Future STEM Workforce (AD)
- CyberCorps(R) Scholarship for Service (SFS)
- EHR Core Research (ECR): Building Capacity in STEM Education Research (ECR: BCSER)
- EHR Core Research: Production Engineering Education and Research (ECR)
- Graduate Research Fellowship Program (GRFP) N
- Graduate Research Internship Program (GRIP)
- Innovations in Graduate Education (IGE) Program N
- National Science Foundation Research Traineeship (NRT) Program N
- Secure and Trustworthy Cyberspace (SaTC)
- Secure and Trustworthy Cyberspace Frontiers (SaTC Frontiers)
- Training-based Workforce Development for Advanced Cyberinfrastructure (CyberTraining) C

Division of Research on Learning in Formal and Informal Settings (DRL)

- Advanced Technological Education (ATE)
- Advancing Informal STEM Learning (AISL)
- Computer Science for All (CSforAll: Research and RPPs) C
- Discovery Research PreK-12 (DRK-12)
- EHR Core Research (ECR): Building Capacity in STEM Education Research (ECR: BCSER)
- EHR Core Research: Production Engineering Education and Research (ECR)
- Innovative Technology Experiences for Students and Teachers (ITEST)
- Smart and Connected Communities (S&CC)
- STEM + Computing K-12 Education (STEM+C)

Division of Undergraduate Education (DUE)

- DUE Current Programs
  - Advanced Technological Education (ATE)

NSF Grant Funding - ~$5.26 million

- Kosko, K., Ferdig, R.E., & Lu, C.C. (2019). Co-PI for funded grant proposal ($1,488,759.00) titled "Design and Implementation of Immersive Representations of Practice." National Science Foundation: Discovery Research K-12 (#1908159).
- Marhefka, D. & Dunlosky, J. (2015). Investigator for funded grant proposal ($732,044) titled "STTR Phase II: Digital eWriter for The Classroom." National Science Foundation: STTR PHASE II (#1534669).
- Ferdig, R.E., Lu, C.C., Lorch, P. & Kratcoski, A. (2014). Principal Investigator for funded grant proposal ($951,808) titled "Innovations in Development: The Use of Mobile Applications for Informal Learning in the Cuyahoga Valley National Park." National Science Foundation: Advancing Informal Science Learning (#1422764).
- Lok, B., Ferdig, R.E., Lind, D. (2008). Co-Principal Investigator for funded grant proposal ($599,000) titled, "Mixed Reality Humans for Training." National Science Foundation Human-Center-Computing Medium program.
- Sadler, T. D., Annetta, L., Koroly, M. J., Ferdig, R. E., Snyder, R. O. (2008). Co-Principal investigator for funded grant proposal ($1,489,596) titled, "OUTBREAK: Opportunities to use immersive technologies to explore biotechnology resources, career education and knowledge." National Science Foundation ITEST program. NSF#0848089.

NSF Reviewerships

- Advancing Informal STEM Learning Review Panel
- Cyberlearning DIP Review Panel
- Cyberlearning EXP Review Panel
- Cyberlearning Resource Center Review Panel
- Informal Science Education Review Panel
- iTEST Review Panel
- STEM+C Review Panel

6 Lessons

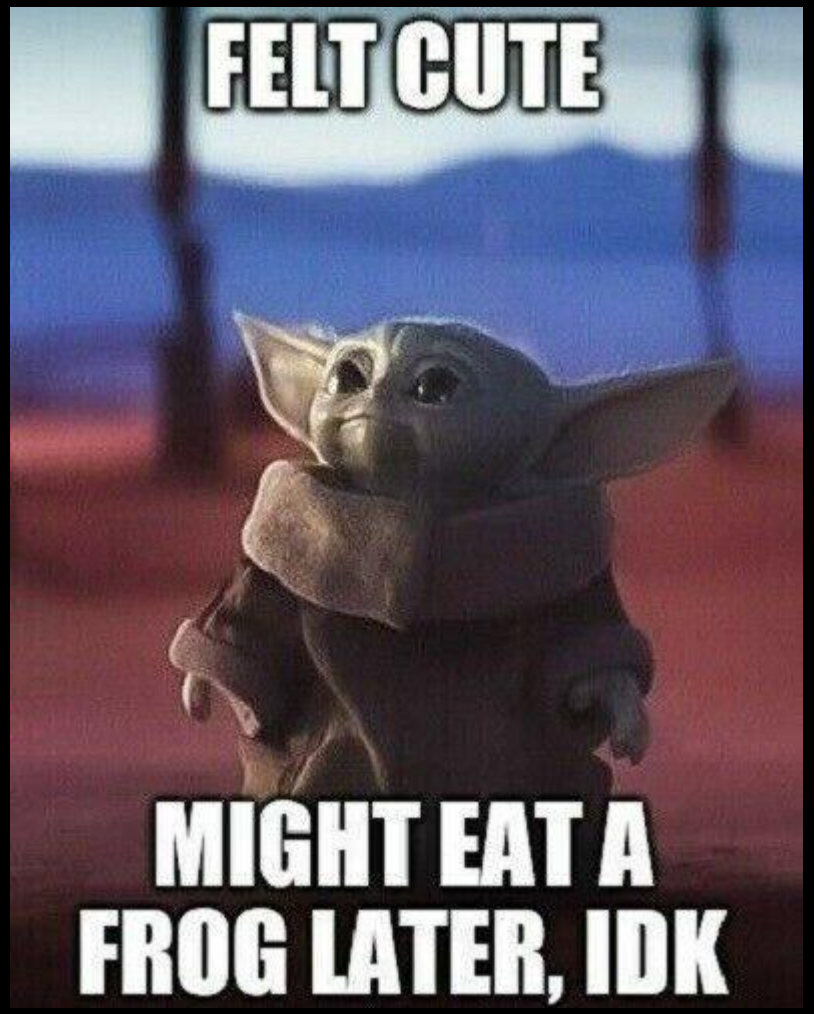
- **Intellectual Merit**: The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts**: The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

Pedagogy Matters
People Matter
Production Matters
Collaboration Matters
Constructs Matter
Ideas Matter

Pedagogy matters

People matter

Production matters



Collaboration matters

Constructs matter

Ideas matter

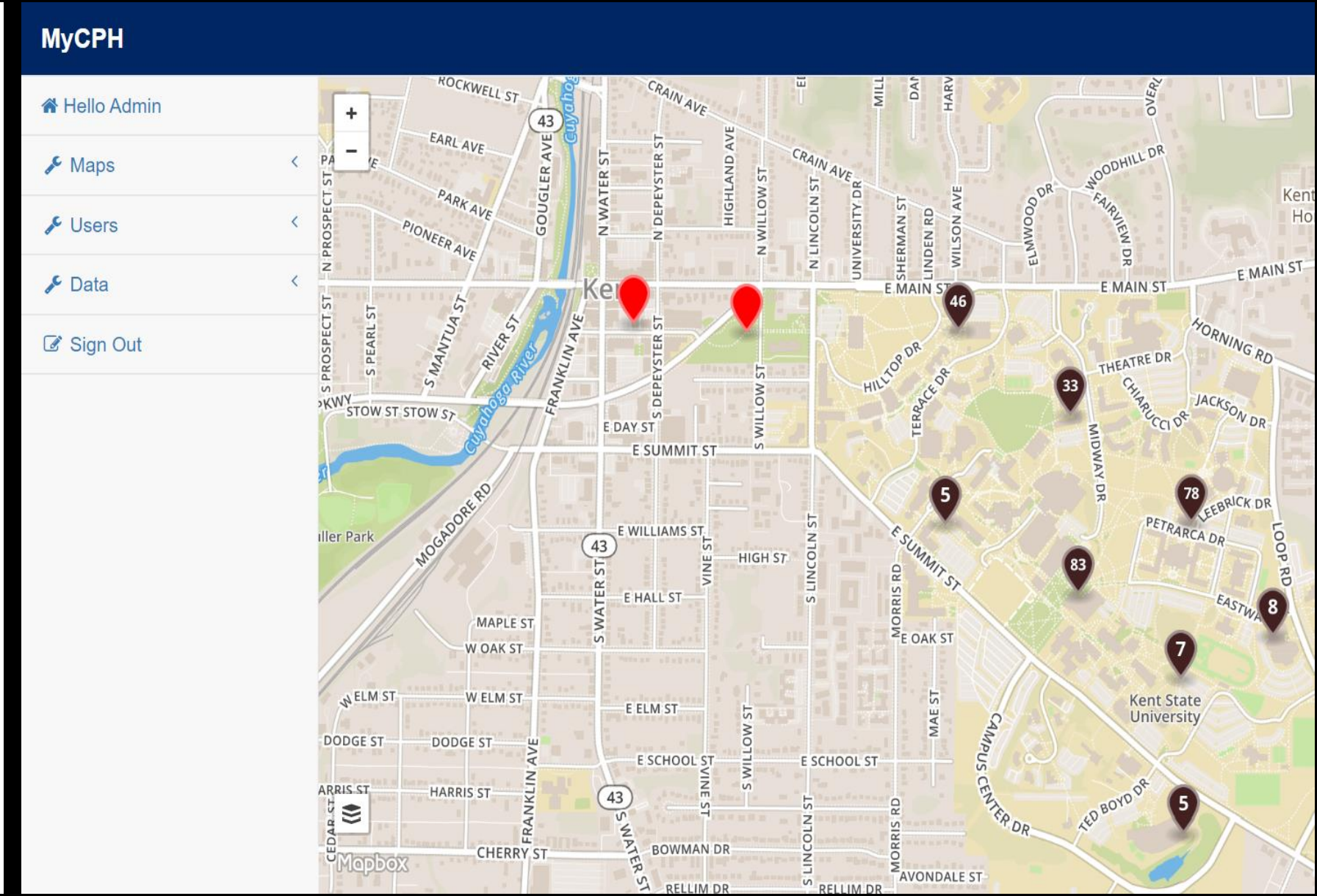
Welcome to MyCPH

MyCPH is a web- and mobile-based point tracking system developed by researchers at Kent State University's Research Center for Educational Technology, College of Public Health, and College of Arts and Sciences. Faculty using MyCPH can track community engagement; they can also create assignments for students. Students can use the web or mobile versions (iOS or Android) to track practicum, internship, and class assignment locations. To begin using MyCPH, please send an email to cphadmin@gmail.com

Existing users, please click "Sign in" on the upper right. You may also download the app below.

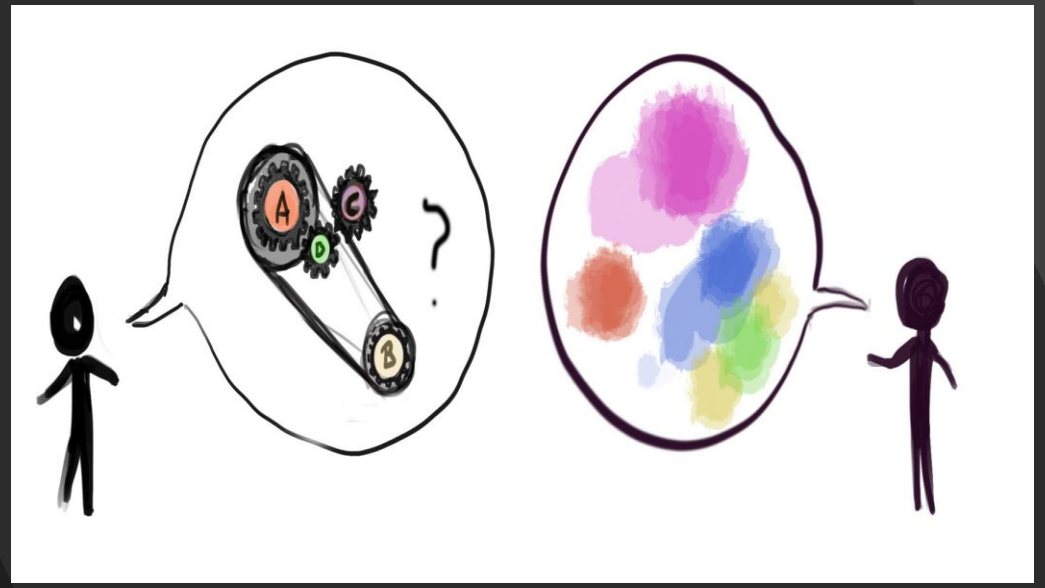
Download on the App Store

GET IT ON Google Play

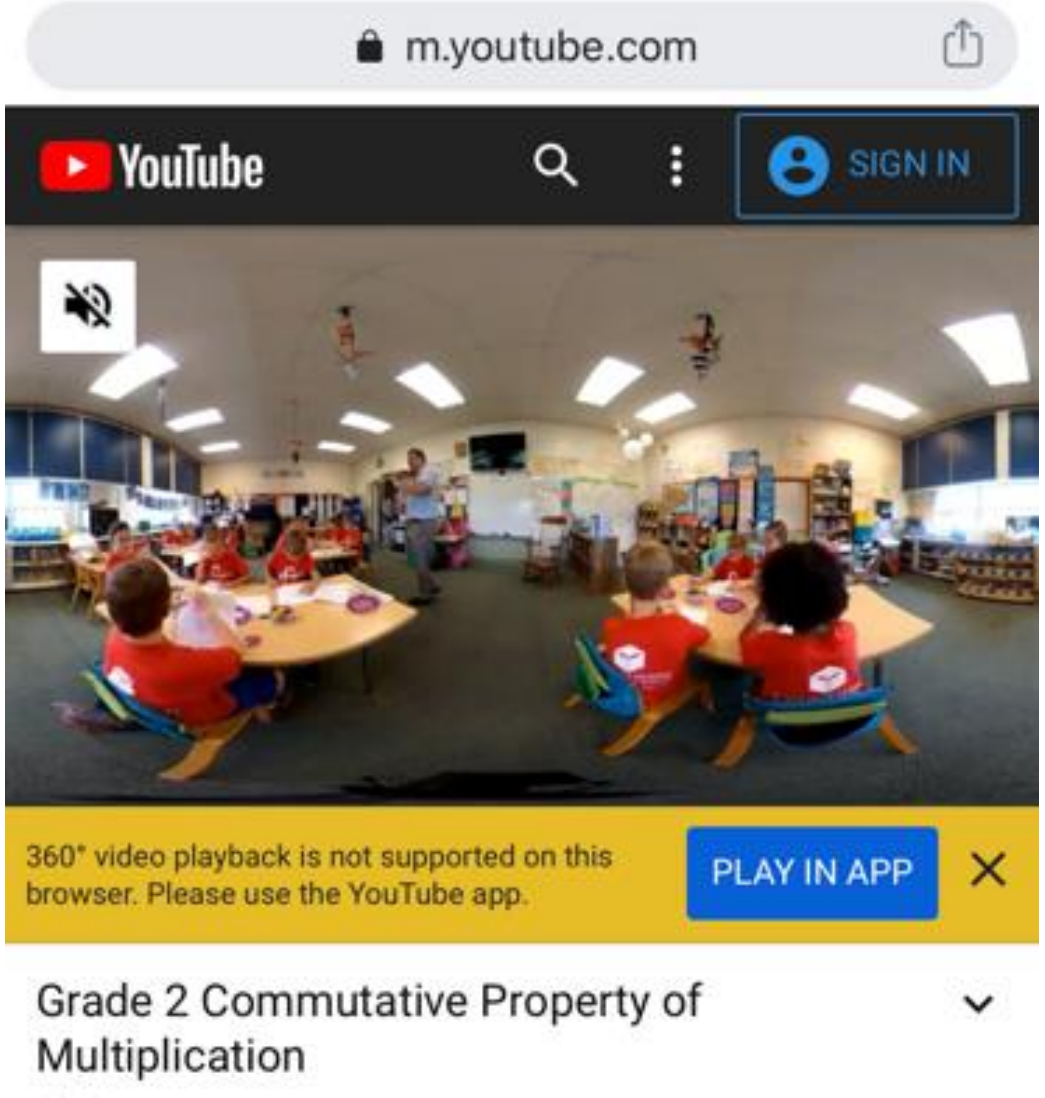


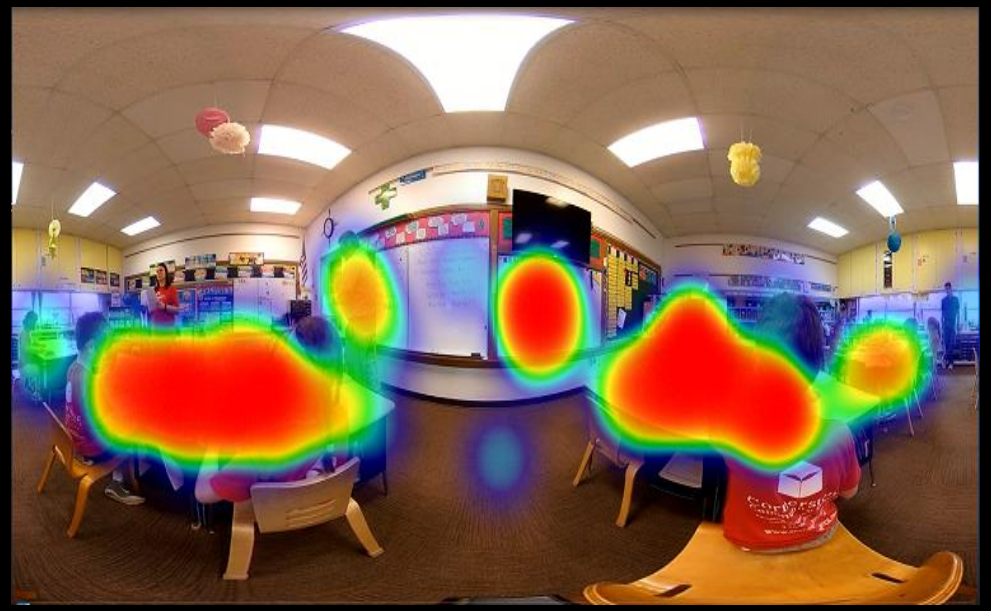
Nursing Simulations

xr.kent.edu



https://tinyurl.com/e2confvideo





Ricoh Theta V 360-Degree Sph

4.4 ⌄ 42

$379.99

✓prime Get it as soon as **Sat, Feb 22**

FREE Shipping by Amazon

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4.4 ⌄ 481

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FREE Shipping by Amazon

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$311.88 (22 used & new offers)

Poweradd 360 Degree Video Camera, Wi
Control,Black

3.5 ⌄ 11

$59.99

Save $7.00 with coupon

FREE Shipping

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3.5 ⌄ 79

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✓prime Get it as soon as **Sat, Feb 22**

FREE Shipping by Amazon

More Buying Choices

$46.94 (3 new offers)

Oculus Go Standalone Virtua

May 1, 2018 | by Oculus

4.4 ⌄ 3,508

Oculus

$149.00 ~~$199.00~~

FREE Shipping by Amazon

In stock on March 22, 2020.

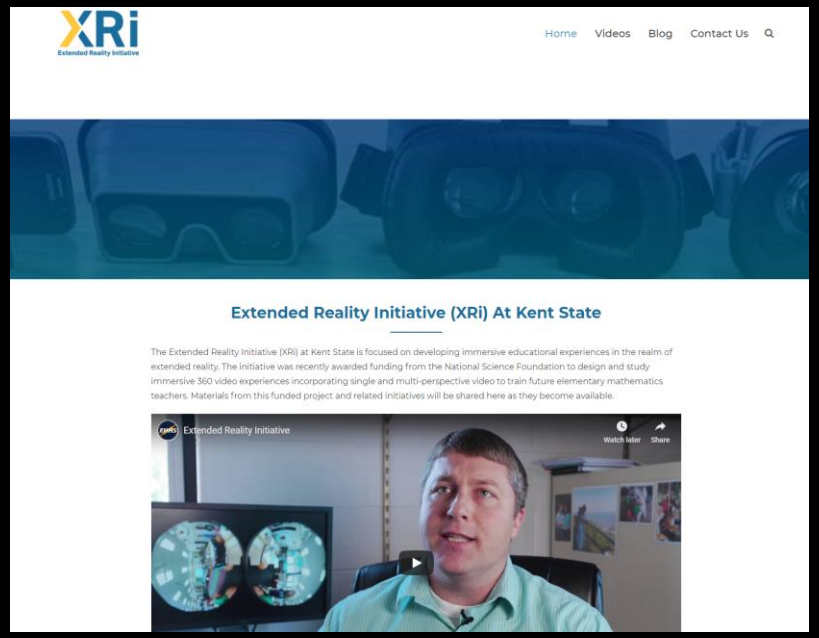
Videos

How to make vr cardboard Easy | vr headset at home

How to Make VR Headset at Home | VR Cardboard

How to make a VR headset for 0 $

https://xr.kent.edu/



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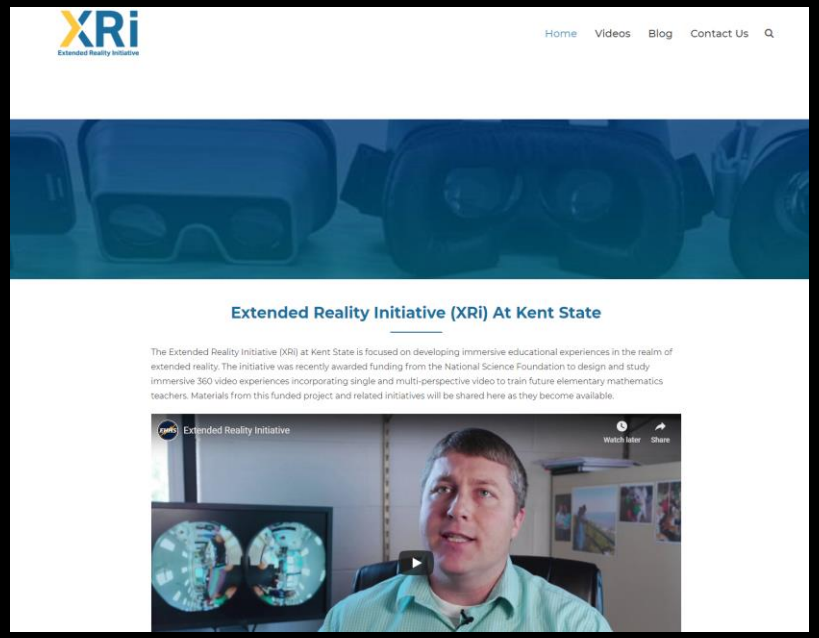

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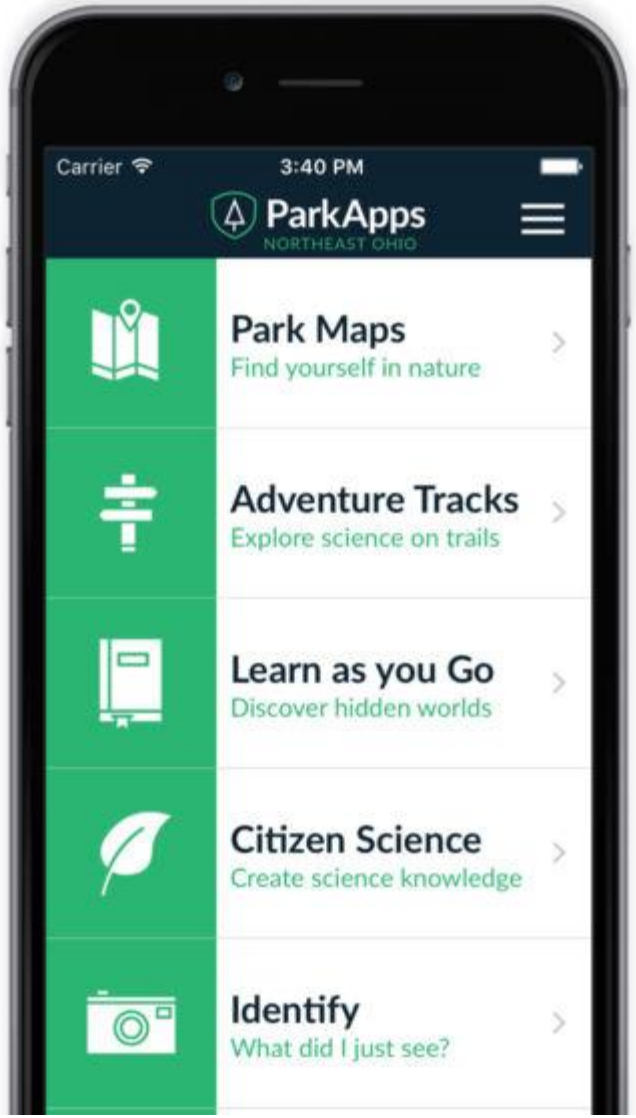
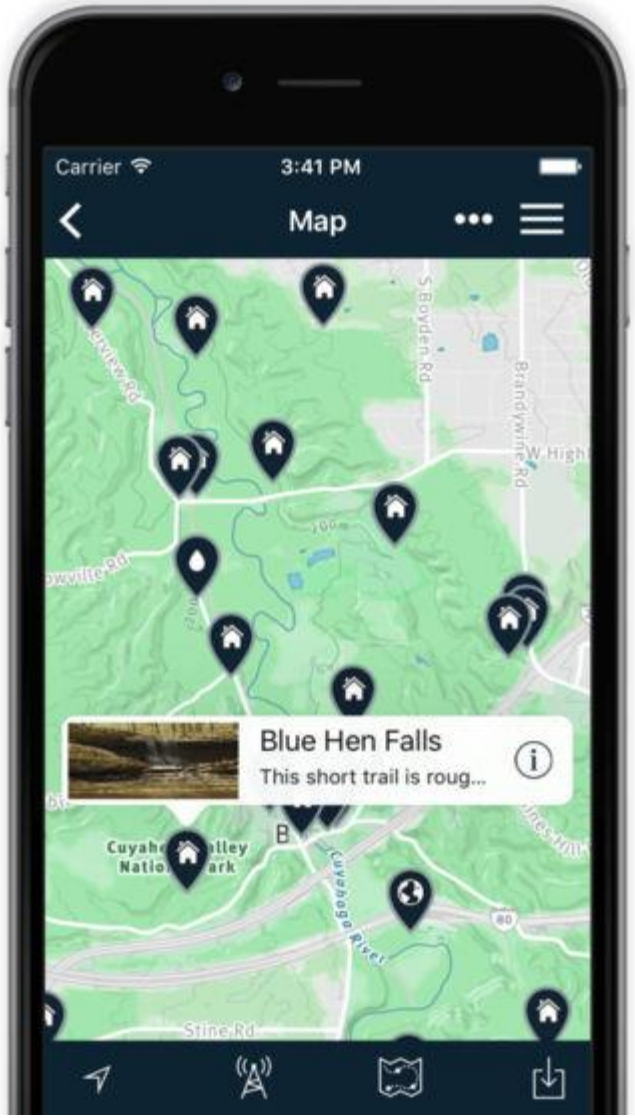
Beaver Marsh
SWAROVSKI

765

ParkApps NE Ohio

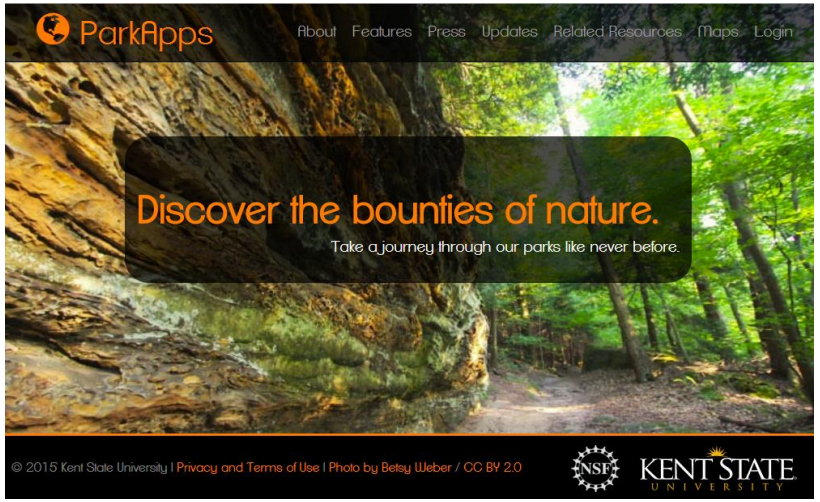


Map Detail



Adventure Tracks

Ledges AT Example



http://parkapps.kent.edu

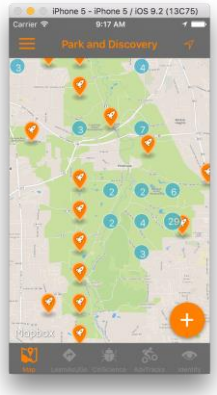
The Use of Mobile Applications for Informal Science Learning in Parks

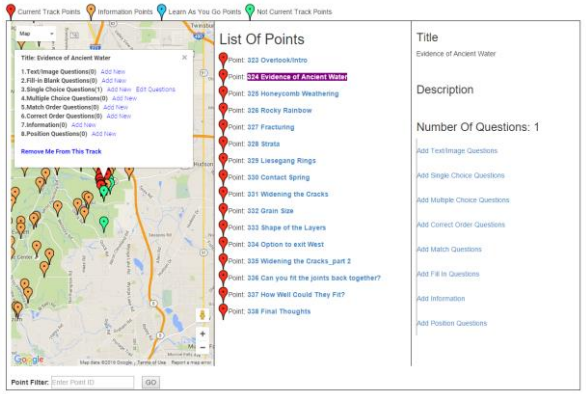
NSF # DRL-1422764

Dr. Richard E. Ferdig [1, PI]
Dr. Patrick Lorch [2, Co-PI]
Dr. CC Lu [1, Co-PI]
Dr. A. Kratcoski [1, Co-PI]

Partners:

Kent State University[1]
Cuyahoga Valley National Park
Cleveland Metroparks[2]
KSU Research & Evaluation Bureau





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rferdig@kent.edu

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Michael Hawkins

KENT STATE UNIVERSITY

Use of ORCID ID and SciEncV

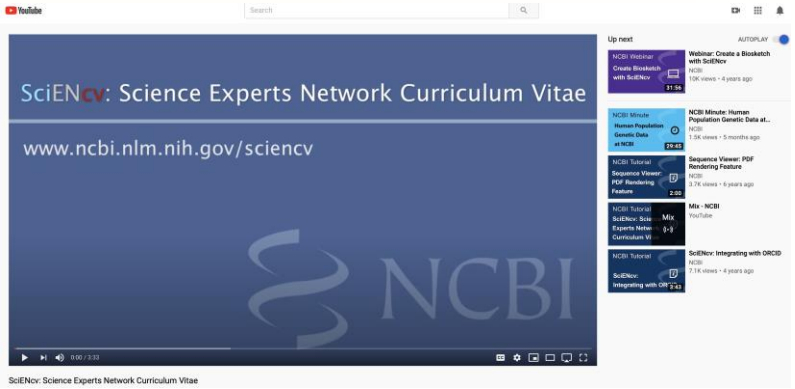
Michael Hawkins
Data Librarian
Kent State

KENT STATE
UNIVERSITY

Useful links for ORCID ID and SciENcv

- https://orcid.org/

- https://www.ncbi.nlm.nih.gov/sciencv/
- https://www.youtube.com/watch?v=PRWy-3GXhtU&feature=youtu.be



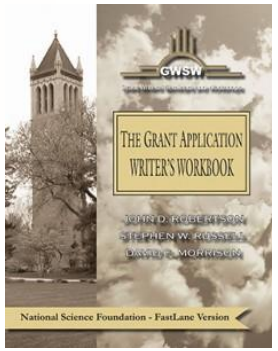
- https://www.library.kent.edu/research-tools

Proposal Development and Submission Support

- **For pre-submission proposal development:**
  - Contact:
  - Lique Coolen at jcoolen@kent.edu

- **For proposal submission:**
  - Contact:
  - Diana Skok at dskok@kent.edu

- **Recommended resource: Grant Application Writer's Workbook:**
  - http://www.grantcentral.com/workbooks/national-science-foundation/



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