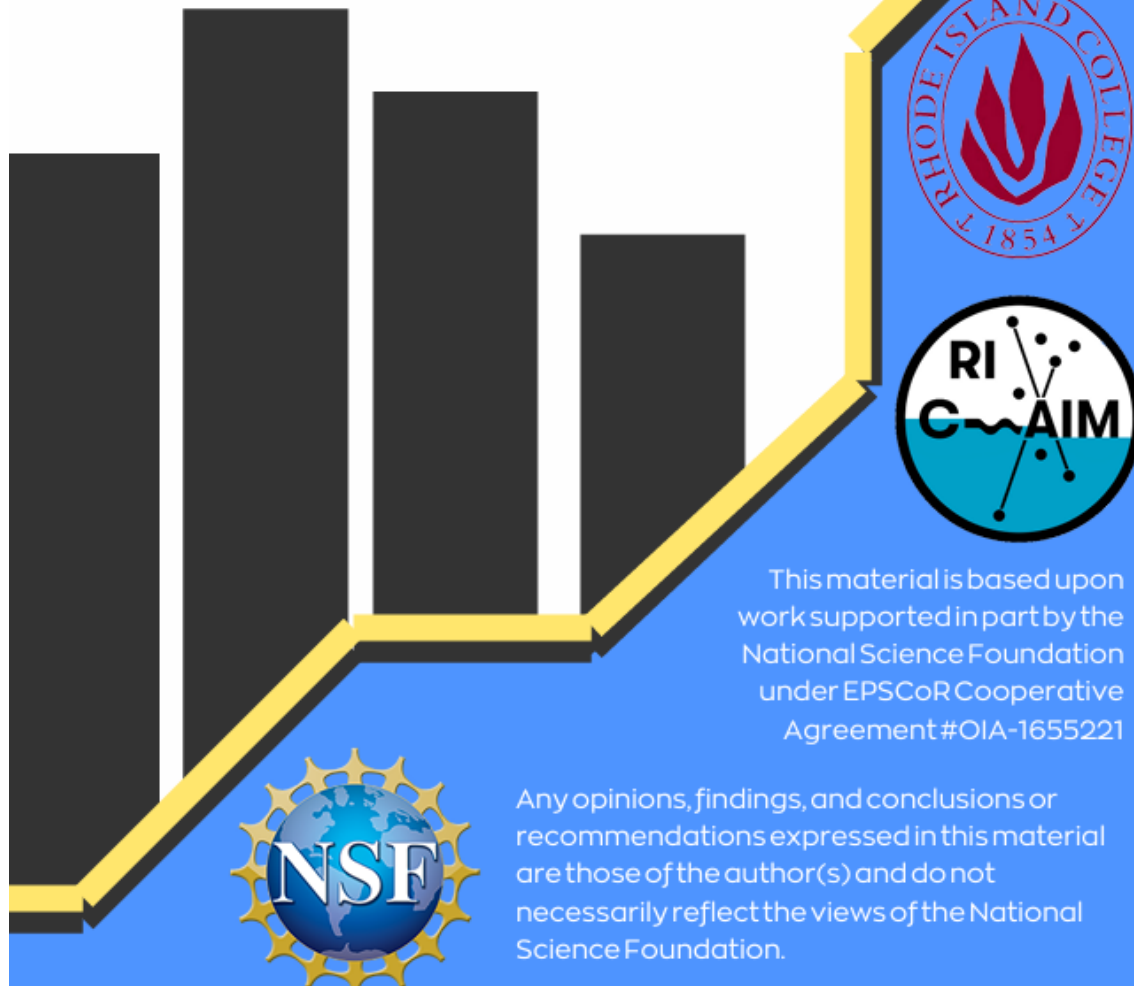


READY, SET, VISUALIZE

May 11th, 2022

9am - 2pm

A three part workshop on two data visualization tools Infogram and SimpleChartsRI.



This material is based upon work supported in part by the National Science Foundation under EPSCoR Cooperative Agreement #OIA-1655221

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.

Workshop Program

- **Introductions:** 9:00 – 9:30
- **Infogram:** 9:30 – 10:45
- **Break:** 10:45 – 10:55
- **SimpleCharts:** 10:55 – 12:30
- **Break:** 12:30- 12:40
- **Teachers work groups:** 12:40 – 1:45
- **Conclusions:** 1:45 – 2:00

About us



Sally Hamouda, CS Assistant Professor at Rhode Island College. I worked with so many great students at RIC as an instructor, Co-PI, advisor, and as a parent.

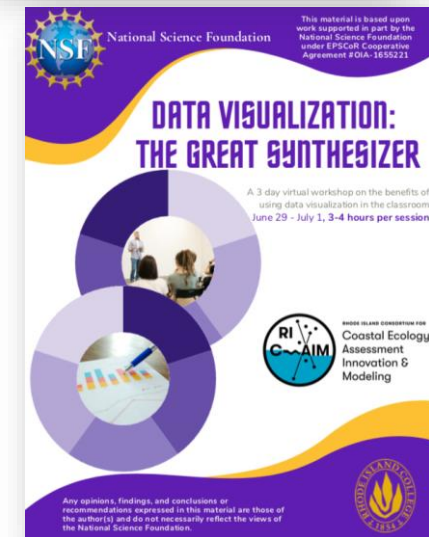
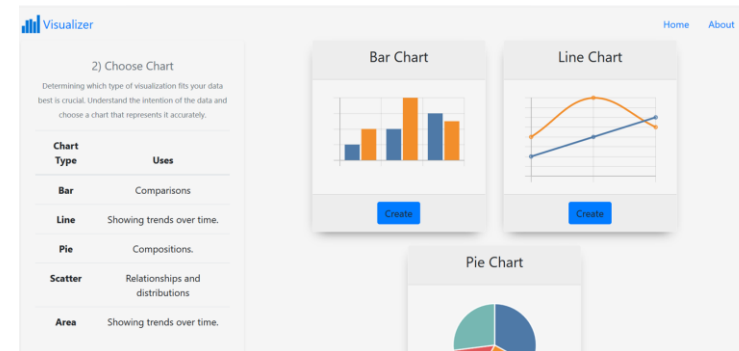
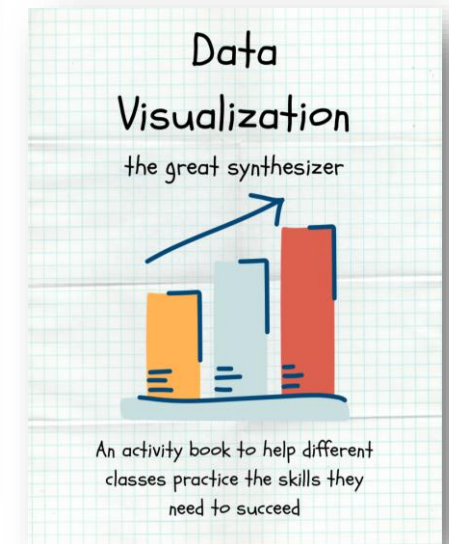
Research Interests: Computer Science Education, Data Mining, Social Network Analysis and Natural Language Processing.



Integrating C-AIM into the Classroom: Data Visualization in High Schools



- Data visualization workshops geared towards high school teachers in RI (Summer 2020 and Summer 2021)
- Development of a web-based data visualizer for high school students and teachers (Conference presentation and manuscript submission)
- Teacher and Student activity books
- Partnerships with specific teachers at Central Falls High School, Central Falls, RI and Mount Pleasant High School, Providence, RI
- Led by Sally Hamouda and Anabela Maia at Rhode Island College



Integrating C-AIM into the Classroom: Data Visualization in High Schools



- Data visualization workshop geared towards high school teachers in RI
 - Best Practices
 - Software
 - Hands on activities where groups of teachers led by a RIC faculty or student develop short activities on data analysis for the high school classroom
 - RI C-AIM data visualization – featuring Dr. Maia, Dr. Patricia Thibodeau (postdoc, RT2) and Ms. Katie Nickles (RT1, IT4)
 - Featured undergraduate students research at RIC
- 14 high school teachers attended
- 12 high school teachers developed in class activities to deploy during the 2020-2021 academic year (available at <http://simplechartsri.com/resources.html>)



Sally Hamouda, Anabela Maia, Lauren Cenedella (UG), Destiny Gonzalez (UG), Meghan VanSchalkwyk (UG), Matt Spaulding (UG), Sam Palacio (UG), Devin Irving (UG), RIC

Integrating C-AIM into the Classroom: Data Visualization in High Schools




- Example of hands-on activity final product

Making Infographics with Piktochart

IN THIS ACTIVITY YOU WILL LEARN ABOUT PIKTOCHART BY CREATING TWO SEPARATE INFOGRAPHICS. THIS CHART DESCRIBES THE STEPS IN THIS ACTIVITY.

1. Create a Piktochart account




<https://piktochart.com/>

2. Watch the Piktochart Tutorial

<https://piktochart.com/video-tutorials/>

3. Create your First Piktochart Infographic




a. Use the Monthly Project Status Report Template and
b. The directions in the Activity Guide Step 1: Piktochart Tutorial

Activity Guide Step 1: Piktochart Tutorial

Use the following criteria for the tutorial:


1. Go to Infographics and search for Monthly Project Status Report (Template)
2. Change the title to a topic of your choice (school appropriate)
3. Change the text Color your choice
4. Change the background photo so that it relates to your topic
5. Provide a description of your project in the Project Overview section.
6. Change the picture in the Project overview section so that it relates to your topical.
7. Replace existing graph with a graph of your choice. (You may create a simple table in Google Slides or Excel. Make sure you have a title and legend. label your x and y axis)
8. Delete the remaining pages of the infographic
9. Save as Piktochart_Tutorial_LastName

4. Create your Second Piktochart Infographic for a Narragansett Bay Species



For 59 years scientists have recorded data on the abundance of many species of fish and shellfish in Narragansett Bay obtained by trawling two locations in the bay. Your infographic will highlight one of the fish/shellfish species.

5. Learn about Narragansett Bay Species and the Fish Trawl Survey



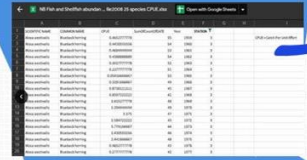
<https://web.uri.edu/fishtrawl/>
<https://web.uri.edu/fishtrawl/methods/>
<https://web.uri.edu/fishtrawl/species/>

6. Open the NB Fish and Shellfish Abundance Data Sheet and find the Information about your Fish/Shellfish species

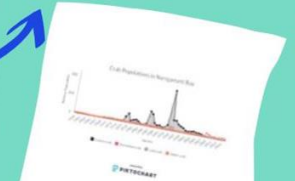
<https://web.uri.edu/fishtrawl/data/>
<https://drive.google.com/drive/folders/31v06tckx7jE4N1vQW72UR10B/w/1PCL>

Pik and Intermediate Crabs Data, 1998 through present
 (https://www.google.com/drive/folders/31v06tckx7jE4N1vQW72UR10B/w/1PCL)
 (https://www.google.com/drive/folders/31v06tckx7jE4N1vQW72UR10B/w/1PCL)
 The data was prepared by the Narragansett Bay Program, URI, and the Narragansett Bay Program, URI.

7. Make a Table for your fish/shellfish species



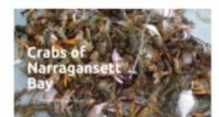
8. Create a Graph for the species





7. Create the Piktogram Infographic


Include:

- A graph generated from the data set
- At least one picture of your animal
- Background information about the animal





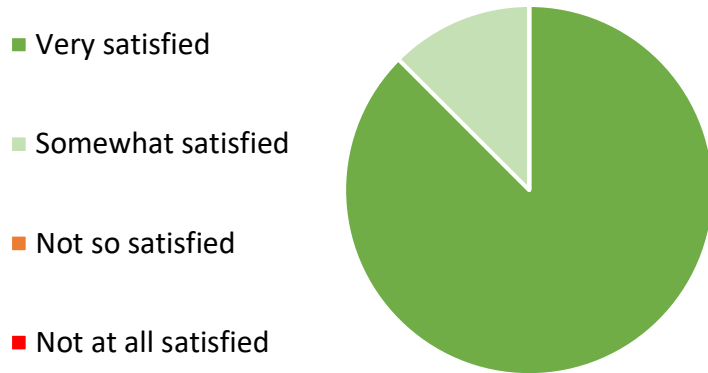




Integrating C-AIM into the Classroom: Data Visualization in High Schools



1. Overall, how satisfied were you with the workshop?



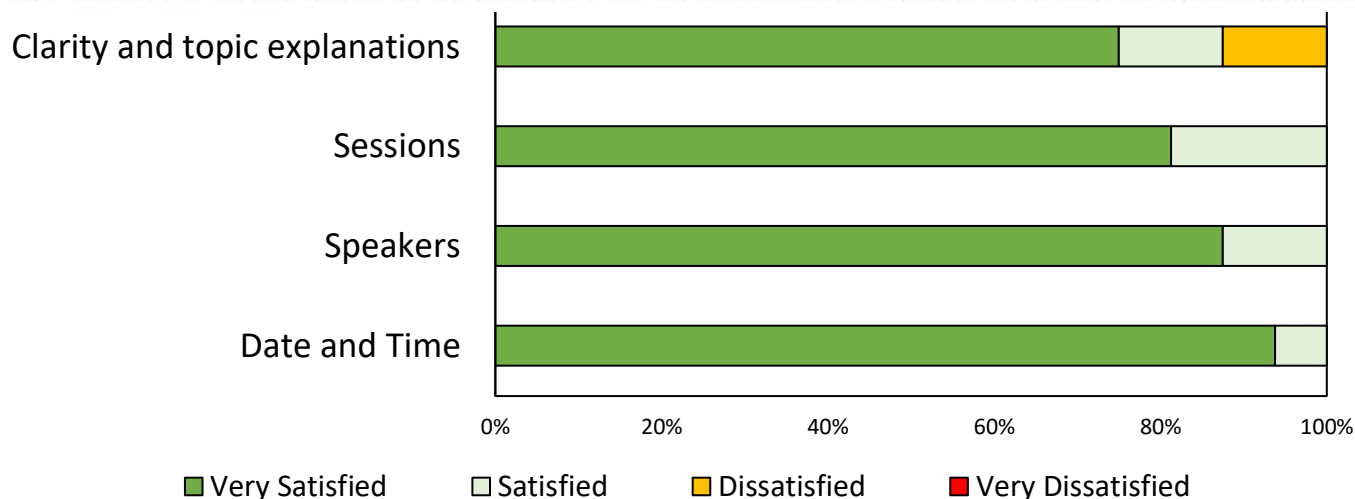
3. How likely are you to recommend this workshop to a friend or colleague?

[More Details](#)

Promoters	10
Passives	4
Detractors	2



2. Please rate your satisfaction level with the following aspects of our event.



"I enjoyed the integration of the work done by the various researchers to the course itself. It was valuable to see the importance of what the workshop was trying to convey [related] to the actual work done by the researchers."




Integrating C-AIM into the Classroom: Data Visualization in High Schools



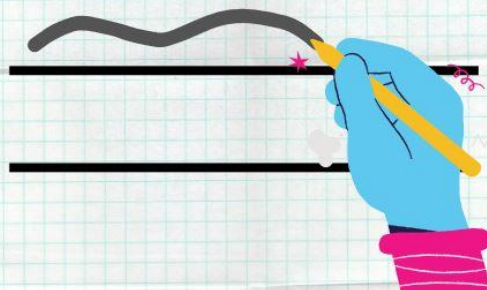
- Partnerships with specific teachers at Central Falls High School, Central Falls, RI (Alison Murray) and Mount Pleasant High School, Providence, RI (Marta Hidalgo) to create RI C-AIM centered activities on water temperature and fish distribution (Computer Science, Mount Pleasant HS) and water chemistry (AP Chemistry, Central Falls HS)
- Development of Teacher and Student Activity Books – pdf and print versions, quizzing in google forms (<http://simplechartsri.com/resources.html>)

Data Visualization
the great synthesizer



An activity book to help different classes practice the skills they need to succeed

Data Visualization
the great synthesizer



A student workbook to accompany data visualization activities.

Sally Hamouda, Anabela Maia, **Lauren Cenedella (UG)**, Destiny Gonzalez (UG), Meghan VanSchalkwyk (UG), Matt Spaulding (UG), Sam Palacio (UG), Devin Irving (UG), RIC



Image courtesy of Lauren Cenedella

Integrating C-AIM into the Classroom: Data Visualization in High Schools



Fishy Data (Cleaning Data)

Categories: Computer Science, Science

Yields: Clean data, Visualization (digital)

Using the URI water temperature data from Fox Island (link #6 in the appendix) and have the students view the data. (Note: the excel sheet is 2,900 cells long, choosing a subset of the data that has some missing values that need to be cleaned is recommended for less experienced students) Ask the students if they think the missing values would impact a visualization. How would it make an impact and what can be done about the missing data? Ask the students what other issues you may find in real world data that is not found in this dataset. (Duplicate data, outliers, missing headers and so on.)

Now have the students clean the data and prepare it for a visualization. This will depend on the programming language or tool the students are using. Below is an example of some of the data with missing values.

	A	B	C	D	E
1379	9/25/1987	Fox Island	20	19.9	
1380	9/1/1987	Fox Island	18.9	18.9	
1381	9/8/1987	Fox Island	19.3	19.3	
1382	9/14/1987	Fox Island	19.8	19.8	
1383	9/21/1987	Fox Island	18	17.9	
1384	9/28/1987	Fox Island	17.1	16.9	
1385	10/5/1987	Fox Island	15.8	15.8	
1386	10/14/1987	Fox Island	12.9	13.2	
1387	10/17/1987	Fox Island	13.4	13.4	
1388	10/26/1987	Fox Island	13.3	13.2	
1389	11/2/1987	Fox Island	12.1	12.1	
1390	11/9/1987	Fox Island			
1391	11/16/1987	Fox Island	7.5		
1392	11/23/1987	Fox Island	7.2		
1393	11/30/1987	Fox Island	6.4		
1394	12/2/1987	Fox Island			
1395	12/7/1987	Fox Island	5.4	5.4	
1396	12/15/1987	Fox Island	5.3	5.3	
1397	12/22/1987	Fox Island	4.8	4.8	
1398	1/7/1988	Fox Island	0.2	-0.3	
1399	1/12/1988	Fox Island	-1.2	-0.3	
1400	1/19/1988	Fox Island	0.2	0.4	
1401	1/25/1988	Fox Island	1.1	1.1	
1402	2/3/1988	Fox Island	1.5	1.3	
1403	2/8/1988	Fox Island	1.3		
1404	2/15/1988	Fox Island	1.5		
1405	2/22/1988	Fox Island	1.8	2.1	
1406	2/29/1988	Fox Island	2.3	2.1	
1407	3/7/1988	Fox Island	3.3	3.5	
1408	3/15/1988	Fox Island	4.3	4.3	

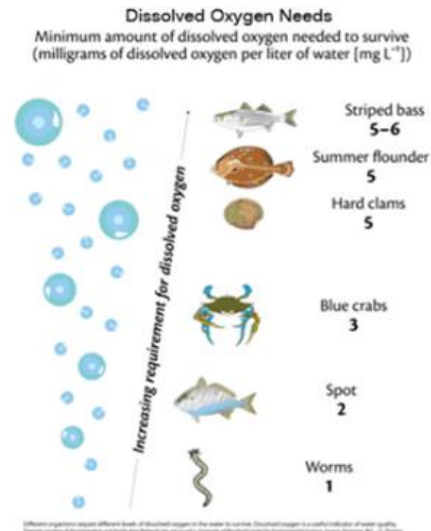
Teacher activity book

Analyze a Visualization

Categories: Science

Yields: Discussion, Visualization (optional)

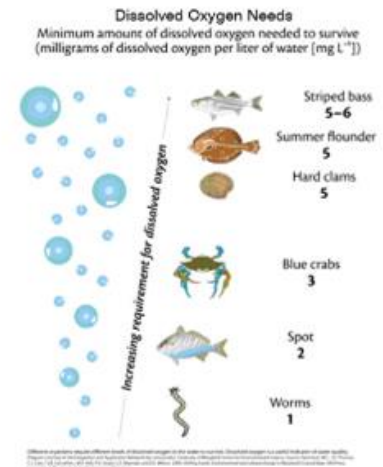
From http://www.watershedcounts.org/marine_water_quality.html, scroll down until you see the three thumbnails of visualizations. (About mid-way down the page). Have the students analyze the visualization titled Dissolved Oxygen Needs. Visualization is also below.



Student Questions: Do you find the following visualization to be effective? What problems do they see? Why do you think the air bubbles to the left were included? Was it a good decision to include the air bubbles? What other ways could the same data be represented?

Analyze a Visualization

Do you find the following visualization to be effective? Yes No Maybe



Explain your reasoning. If you think it needs improving what would you improve or change and why?

What problems do you see?

Student activity book

Sally Hamouda, Anabela Maia, Lauren Cenedella (UG), Destiny Gonzalez (UG), Meghan VanSchalkwyk (UG), Matt Spaulding (UG), Sam Palacio (UG), Devin Irving (UG), RIC

Integrating C-AIM into the Classroom: Data Visualization in High Schools



- Simple Data Visualizer
<http://simplechartsri.com>



Image courtesy of Matt Spaulding

Image courtesy of Sam Palacio



Sally Hamouda, Matt Spaulding (UG and Technician after graduation), Sam Palacio (UG)



Integrating C-AIM into the Classroom: Data Visualization in High Schools



- Upcoming Workshop 2.0 July 27-29 2021, incorporating teachers' feedback
- Mini-workshop and project with teachers, mentors and students planned for the 2021 Summer Program with Mount Pleasant High School using the same tools

Teaching Data Visualization Tools for High School Teachers

A 3-day virtual workshop on how to teach data visualization tools and how to use it into the classroom.

July
27th | 28th | 29th

Online

3 hours
Per session

Limited number of stipends are available, and values are to be decided.



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Integrating C-AIM into the Classroom: Data Visualization in High Schools



- Data visualization tools workshops geared towards high school and middle school teachers in RI (Summer 2021 and Summer 2022)
- Version 2 of a web-based data visualizer for high/middle school students and teachers.
- Journal paper published and Conference poster accepted.
- Teacher instructions book created to help them navigate through the tools.
- Led by Sally Hamouda and Anabela Maia at Rhode Island College

SimpleChartsRI: A User-Friendly Web-Tool for Creating Effective Visualizations

Spaulding Matthew Michael*, Sean Khang and Hamouda Sally

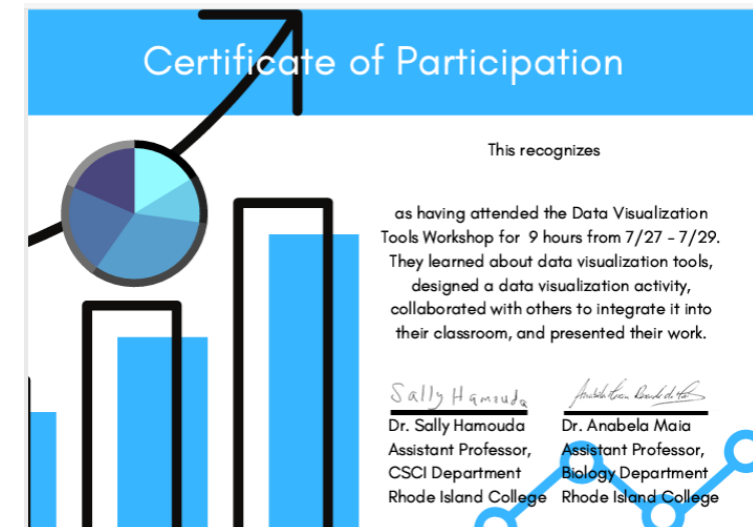
Rhode Island College, Providence, Rhode Island, United States



Integrating C-AIM into the Classroom: Data Visualization in High Schools



- Data visualization workshop geared towards high and middle school teachers
 - Infogram, SimpleCharts, and Python.
 - Hands on activities where groups of teachers led by a RIC faculty or student develop short activities on data analysis for the high school classroom
 - RI C-AIM data visualization – featuring Dr. Flavin.
 - 13 high school teachers attended
- 13 high school teachers developed in class activities to deploy during the 2021-2022 academic year (available at <https://simplechartsri.com/resources.php>)




Integrating C-AIM into the Classroom: Data Visualization in High Schools



- Example of hands-on activity final product using the Infogram tool taught during the workshop

Egg Drop Experiment

Student Model for Teaching Data Visualization Tools for High School Teachers
Mark Davis, Barrington Middle School



Brainstorming Problems

- Slowing down the descent speed
- Cushioning the egg to absorb the impact of landing
- Maintaining best orientation during free fall

Image courtesy of The Leader

Parameters

- Fixed drop height of 5 meters
- Made with household or simple craft items
- Must be replicable, not a one-time use

Planning model from our teacher.


Research

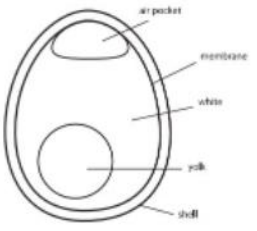
Our team used Google to search for existing models of the Egg Drop Challenge machine.

Bubble Wrap
Parachute
Popsicle Sticks
Basket
Triangles

Frequency of egg drop construction ideas


Triangle connections were stronger as learned in the Marshmallow Challenge.





We learned that arches district impact forces better than straighter surfaces. Our research showed that the egg has a better chance of staying intact if it lands upright. Since yolk is drawn downwards in a free fall and is a better absorber than the air pocket, having the egg land with the wider arch-side at the bottom is best.

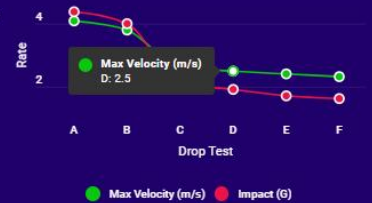
We also watched this video by Mark Rober to demonstrate existing models that were effective. We learned that the best designs would prevent impact and punctures. We also examined ways to slowing the rate of fall and keep the egg from rolling or floating away.



Video courtesy of Mark Rober's Youtube Cha

Prototype

We used three distinct prototypes to find the best model for our final build. The first design (A) used a tooth-pick cage. The second design (B) used a bubble wrap capsule. The final design (C-F) used a combination of a parachute and a bubble-wrap capsule.



Drop Test	Max Velocity (m/s)	Impact (G)
A	~3.5	~3.5
B	~3.0	~3.0
C	~2.5	~2.5
D	~2.0	~2.0
E	~2.0	~2.0
F	~2.0	~2.0

Recorded test conditions (temperature, wind speed, humidity)
Moment-by-moment data of final drop
Reflected on our results and related back to the Brainstorm

Image Courtesy of Meredith Martin

SOURCES

- National Science Teachers Association. "Next Generation Science Standards Hub." ngss.nsta.org/DisplayStandard.aspx?view=topic&id=39
- Park, John. "Digital Egg Drop Experiment with CLUE." 20 Apr 2021. learn.adafruit.com/egg-drop-clue/
- Rober, Mark. "1st Place Egg Drop project ideas - using SCIENCE." YouTube, uploaded by Mark Rober, 27 May 2015, youtu.be/nsnyl8lIfH4
- Science World. "Egg Drop." www.scienceworld.ca/resource/egg-drop/

Share Made with Infogram

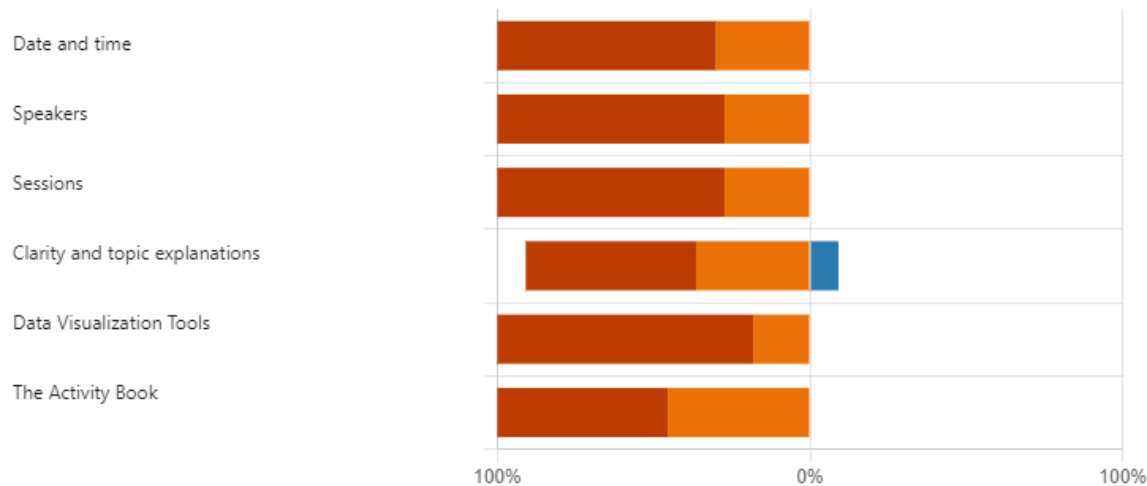
Integrating C-AIM into the Classroom: Data Visualization in High Schools



8. Please rate your satisfaction level with the following aspects of our event.

[More Details](#)

Very satisfied Satisfied Dissatisfied Very dissatisfied



10. What do you feel was the best, or easiest to understand, part of the workshop?

[More Details](#)

Insights

11 Responses

Latest Responses

"Simplecharts RI"

"Speaker - nature lab - RISDI"

"The best part of the workshop was interacting with the different visualization tools and having Sally walk us through each tool."

3 respondents (27%) answered **Simple Charts** for this question.



"This year met my expectations in that it introduced specific platforms (Python, Infogram, SimpleChartsRI) and allowed participants the opportunity to practice on these platforms."

"The best part of the workshop was interacting with the different visualization tools and having Sally walk us through each tool."

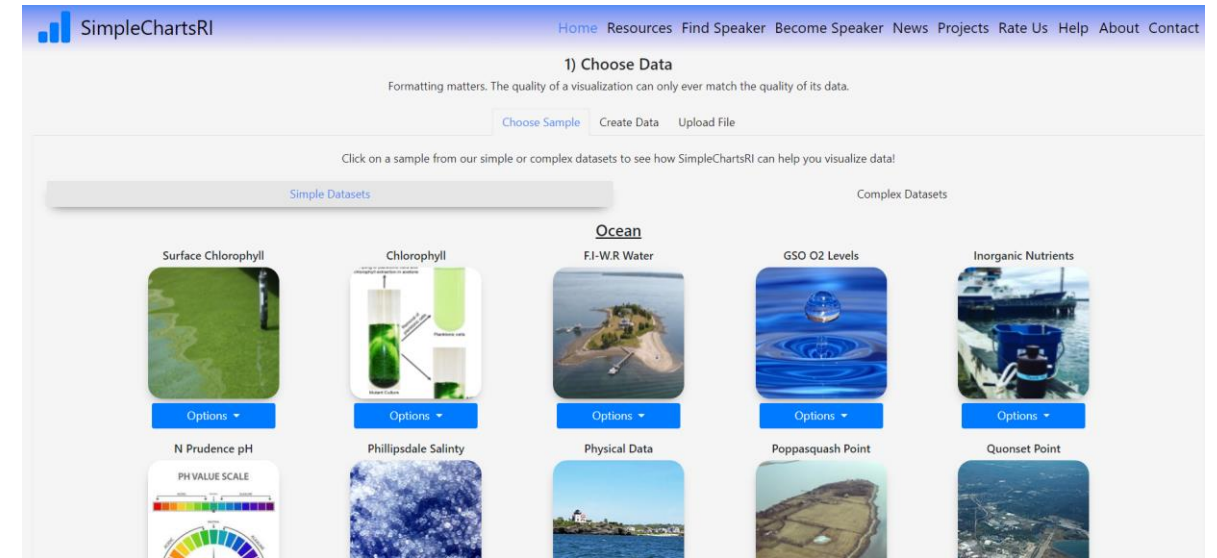
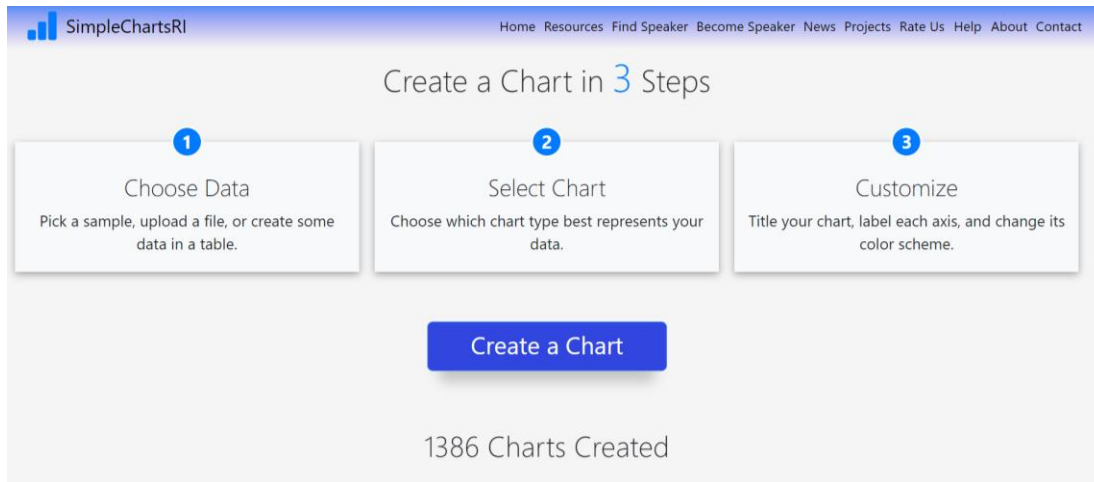


Integrating C-AIM into the Classroom: Data Visualization in High Schools

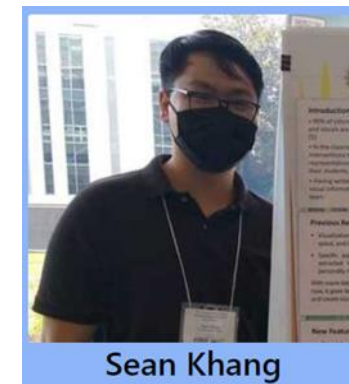


- Simple Data Visualizer Version 2 With Visual Datasets

<http://simplechartsRI.com>



Sally Hamouda, **Sean Khang**



Sean Khang

Image courtesy of Sean Khang



Integrating C-AIM into the Classroom: Data Visualization in High Schools



- Upcoming Workshop 3.0 May 11th, incorporating teachers' feedback

Day 1

Learn about Infogram and how all its features can help!

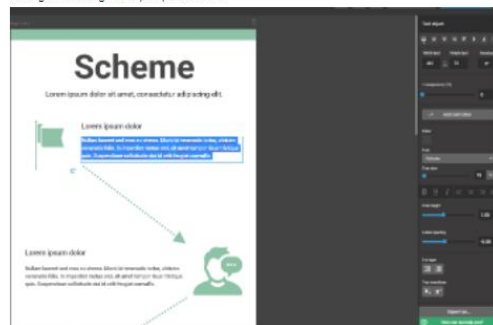
Infogram is a data visualization and infographics platform that allow people to create and share charts, infographs, and maps. This site can be used without any prior coding knowledge or skills.

(Infogram tutorial w/ explanation of all features)

1. When logging onto the site, you are given templates to start with to start giving life to your data. The template options range from charts, maps, infographics, to dashboards, and even social media posts.

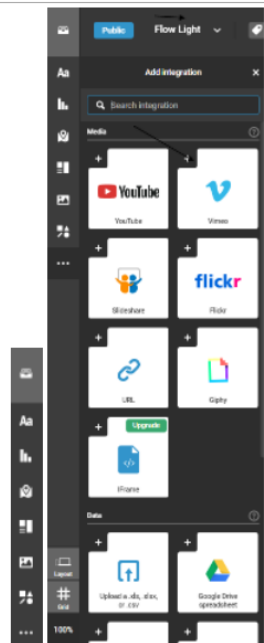


2. Each individual element can be clicked on to edit specific features.
 - a. For example, in a column chart the number of data and rows can be edited by double clicking the column element.
 - b. Files of data can also be uploaded to Infogram by clicking options such as upload file or clicking on the Google Drive/Dropbox buttons.



3. On the left-hand bar there is a navigation bar that allows you to change the type of chart you are working with. There are also options to add maps, elements, graphics, shapes, and integrations.

4.



Day 2

Learn about SimpleChartsRI and how all its features can help!

SimpleChartsRI is a web-based tool that helps users create visualizations. SimpleChartsRI provides fundamental charting options that enables users to simply create charts, without downloading a program or paying a fee.

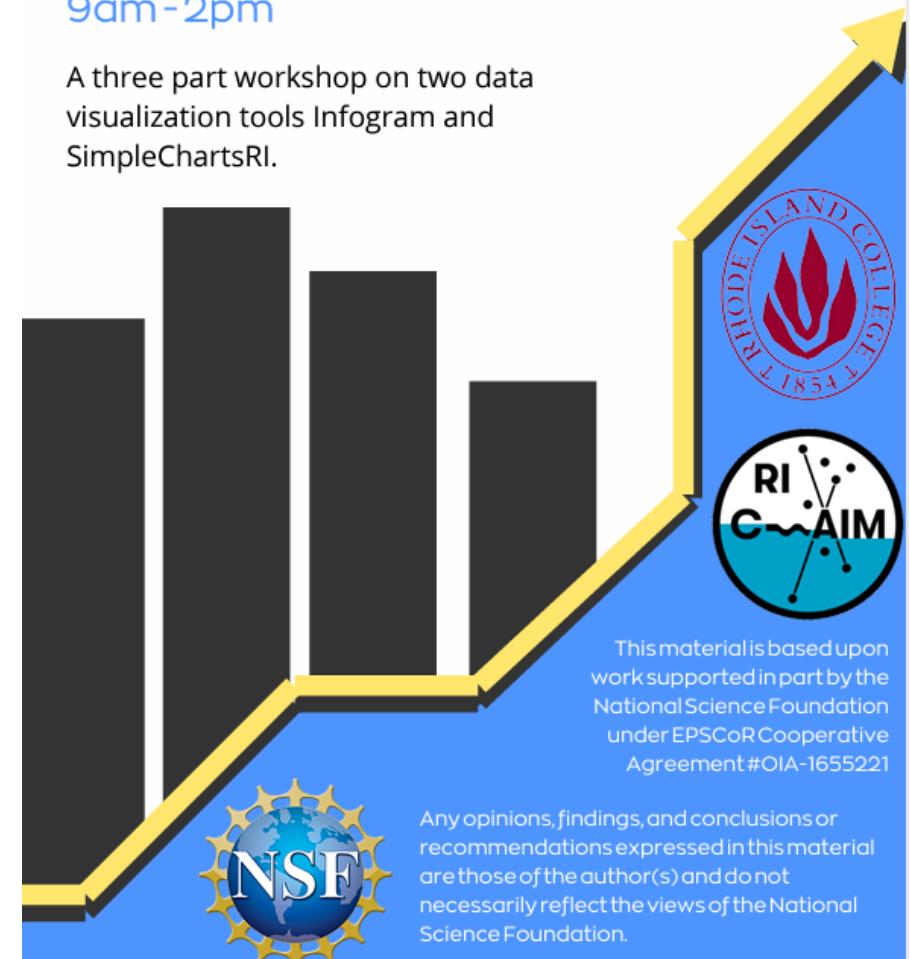
(SimpleChartsRI tutorial w/ explanation of all features)

READY, SET, VISUALIZE

May 11th, 2022

9am - 2pm

A three part workshop on two data visualization tools Infogram and SimpleChartsRI.



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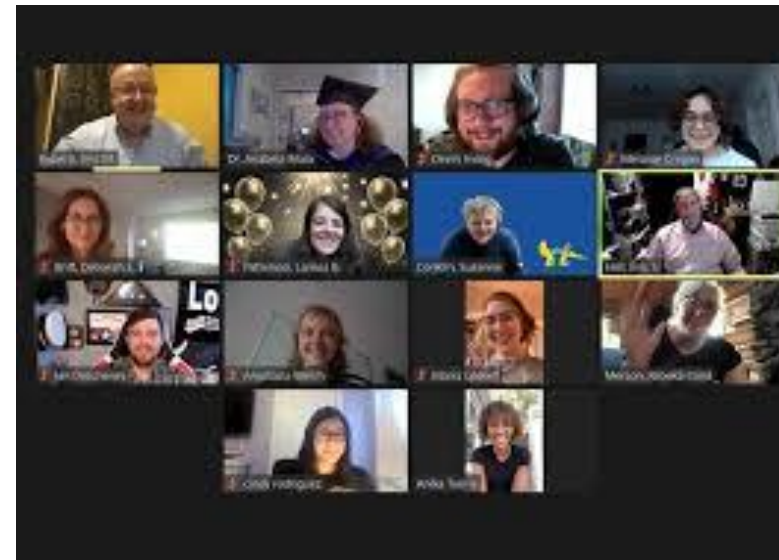
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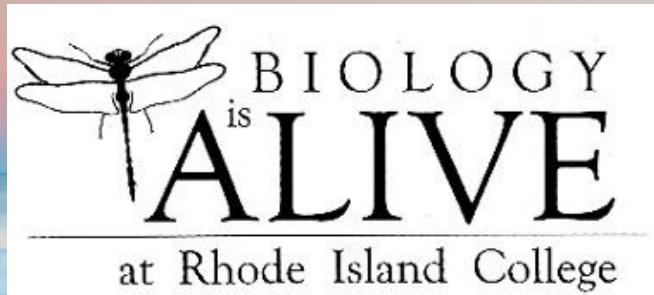
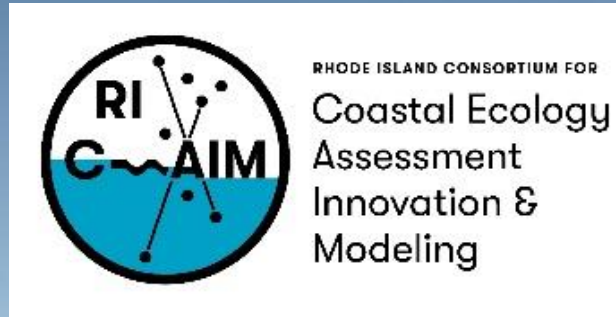
About us



Anabela Maia Biology Associate Professor at Rhode Island College.



REACH
INSPIRE
CONNECT



Dr. Anabela Maia, PhD
Department of Biology
Rhode Island College

aresendedamaia@ric.edu



[@AnabelaM](https://twitter.com/AnabelaM)

<http://maialabric.wordpress.com>





RHODE ISLAND COLLEGE

RI C-AIM Who we are?












The Rhode Island Consortium for Coastal Ecology Assessment, Innovation and Modeling

RI NSF EPSCoR Award #OIA-1655221



@RIEPSCoR

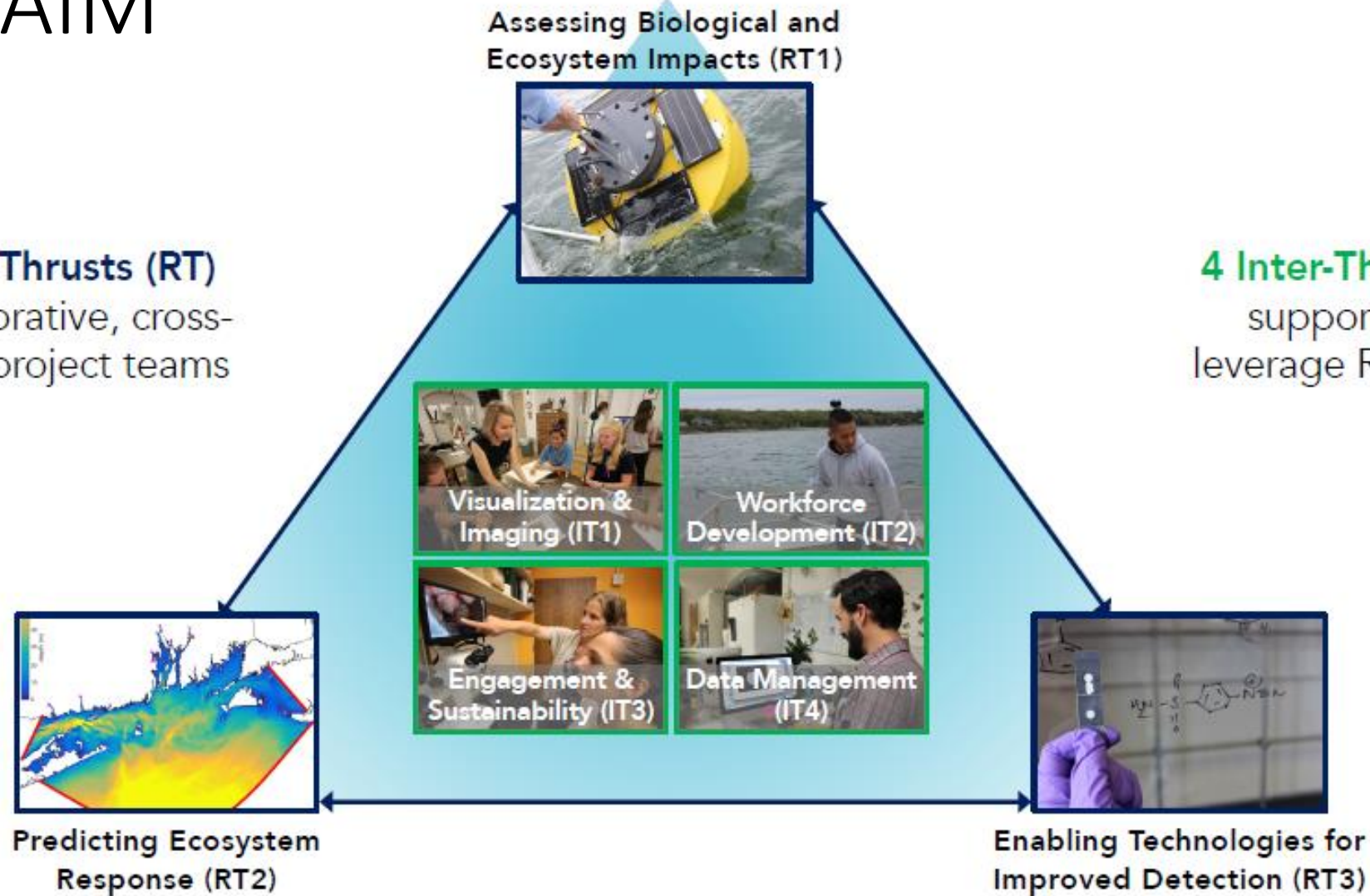
 <p>THE UNIVERSITY OF RHODE ISLAND</p> <p>University of Rhode Island RI C-AIM lead institution</p> <p>VISIT →</p>	 <p>BROWN</p> <p>Brown University data management, ocean modeling</p> <p>VISIT →</p>	 <p>BRYANT UNIVERSITY</p> <p>Bryant University marine food webs, microbial dynamics</p> <p>VISIT →</p>	 <p>PROVIDENCE COLLEGE</p> <p>Providence College species identification, visualization</p> <p>VISIT →</p>
 <p>RHODE ISLAND COLLEGE</p> <p>Rhode Island College microbiological modeling, workforce development</p> <p>VISIT →</p>	 <p>RHODE ISLAND SCHOOL OF DESIGN</p> <p>Rhode Island School of Design data visualization, graphical research translation</p> <p>VISIT →</p>	 <p>Roger Williams University</p> <p>Roger Williams University microplastics detection, undergraduate research training</p> <p>VISIT →</p>	 <p>SALVE REGINA UNIVERSITY</p> <p>Salve Regina University microfluidic systems, planktonic diversity characterization</p> <p>VISIT →</p>

RI C-AIM



3 Research Thrusts (RT)
guide collaborative, cross-
institutional project teams

4 Inter-Thrusts (IT) span,
support, guide, and
leverage Research Thrusts





RHODE ISLAND COLLEGE

RI C-AIM Inter Thrusts



Educational initiatives are incorporating RI C-AIM research into college-level courses and senior capstone projects



SURF & SURF+ are paid programs that provide undergraduates with first-hand experience in research

IT3 – Stakeholder engagement



Visualization and Imaging (IT 1) Across thrusts, RI C-AIM is developing novel approaches to visualization of scientific observations in complex ecosystems through collaborations between engineers, designers, artists and oceanographers, thus fostering greater understanding from industry leaders, policy makers and the public.

IT2 – Workforce Development and Increasing representation in STEAM

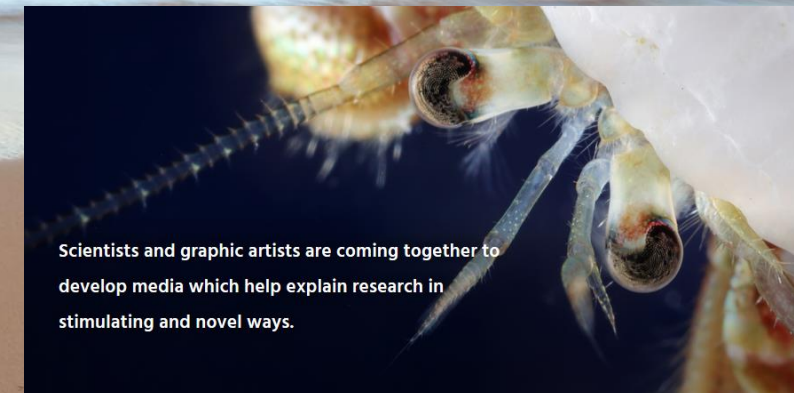


Diversity Action Committee (DAC): Resources for students and faculty to achieve inclusive collaborations



Career Development: RI C-AIM offers many opportunities in research and professional skills training

IT1 – Visualization and Imaging



Scientists and graphic artists are coming together to develop media which help explain research in stimulating and novel ways.

RI Data Discovery Center

- One Place, real time (and historic) data

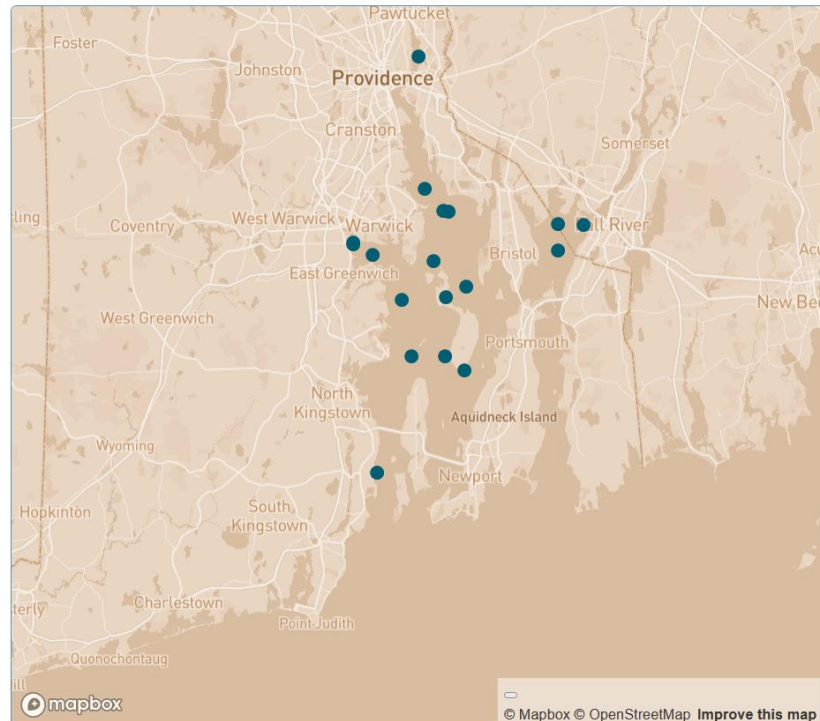
<https://ridatadiscovery.org/#/>



Buoy Locations

Here you can find the location and other information about the buoys and stations where we collect data.

Buoys were equipped with two sondes that measured temperature, salinity, dissolved oxygen and depth at approximately 1 meter from the bottom and 0.5 meters below the surface. In addition, chlorophyll fluorescence was measured by the near surface sonde. Measurements were collected at fifteen minute intervals and transmitted to shore via cellular modems every eight hours or via radio signal every fifteen minutes. [Source](#)



Switch to Table View



RHODE ISLAND COLLEGE

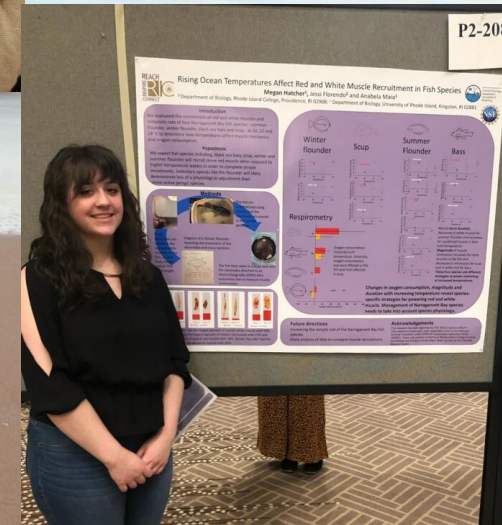
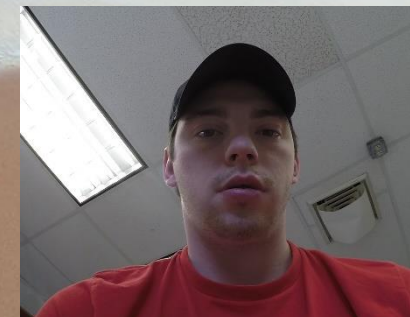
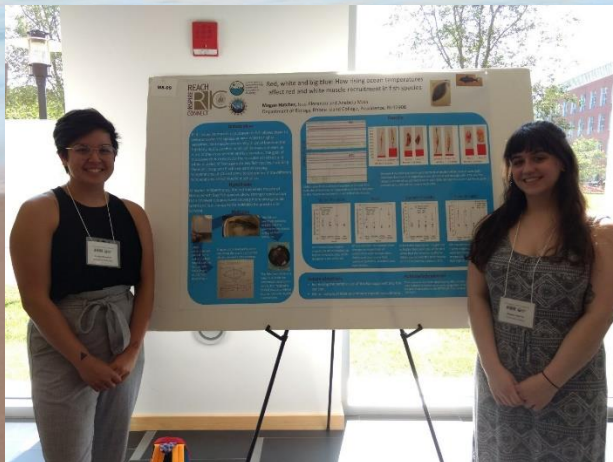
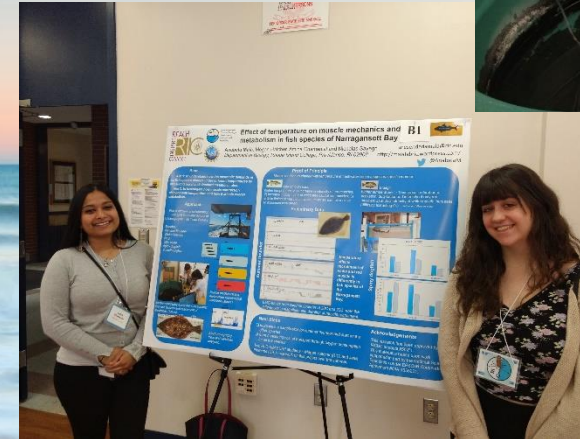
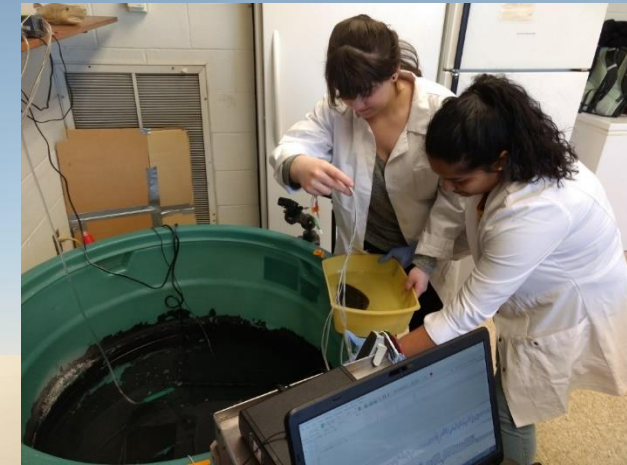
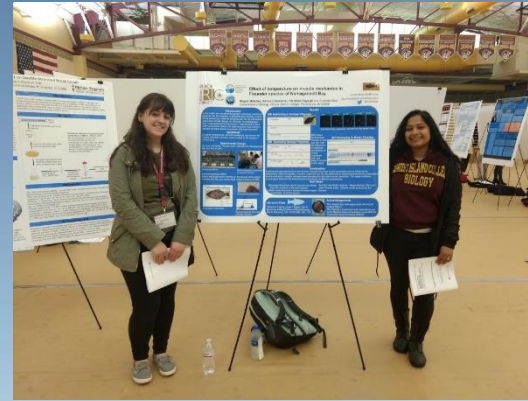
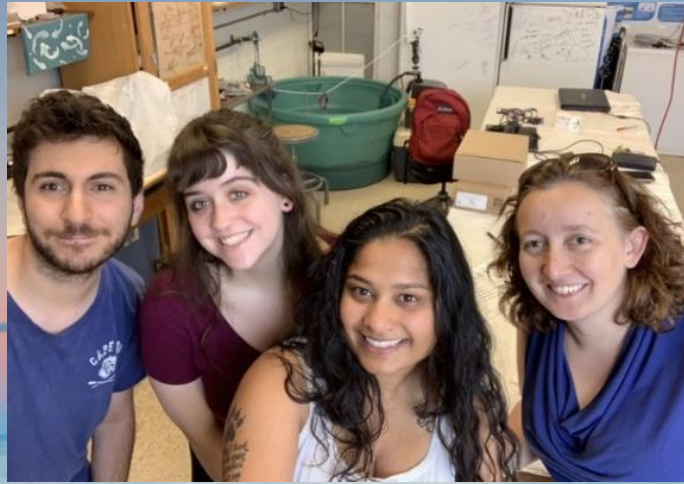
RI C-AIM Core Facilities



RI C-AIM at RIC



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Other Outreach Projects



Peers 'n' Pubs
Science Behind the Scenes

peers 'n' pubs

Get Hooked on Fin-Tastic Shark Research!

RESEARCH ARTICLE
Hydrodynamic function of dorsal fins in spiny dogfish and bamboo sharks during steady swimming

breaks down this

Anabela Maia, PhD *(she/her)*
Rhode Island College
@anabelam

with the help of her friend

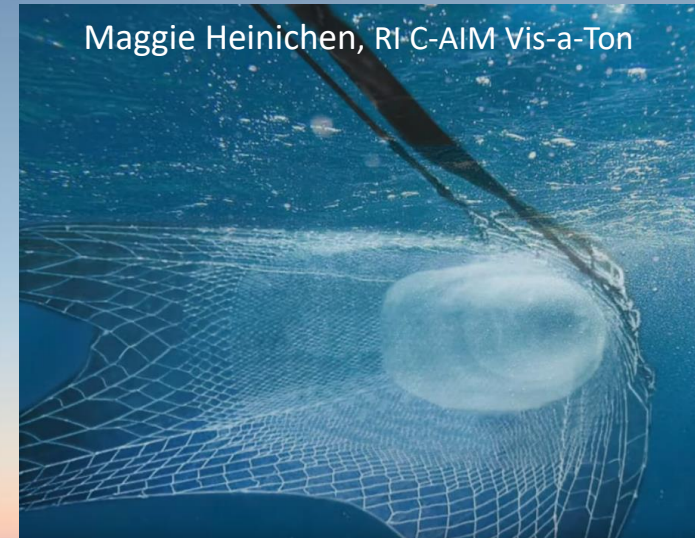
PROJECT TOMORROW

Ren Whitaker *(she/her)*

August 15 | 7pm ET/6pm CT/4pm PT
Register: <https://bit.ly/3fMUnjO>

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