

Shenandoah Valley Rural Regional
College Partnership Laboratory Schools



Virginia
College Partnership
Laboratory School
Application



Shenandoah Valley Rural Regional College Partnership Laboratory Schools



Project Coordinators



Padhu Seshaiyer, Ph.D.

Professor and Director, George Mason University
Appointee, Virginia STEM Advisory Board, Office of the Governor
Appointee, Virginia Workforce Development Board, Office of the Governor
Chair, US National Academies Commission on Mathematics Instruction
Director, COMPLETE Center, George Mason University

Phone: 8062398738 (c)

Email: pseshaiy@gmu.edu

Web: <http://math.gmu.edu/~pseshaiy>

Twitter: @padhuseshaiyer

LinkedIn: <https://www.linkedin.com/in/padhuseshaiyer/>



Deb Crawford, Ph.D.

Supervisor of Mathematics & World Language
Instructional Services Department
1415 Amherst Street
Winchester, VA 22601

Phone: 540-662-3889 ext. 88133

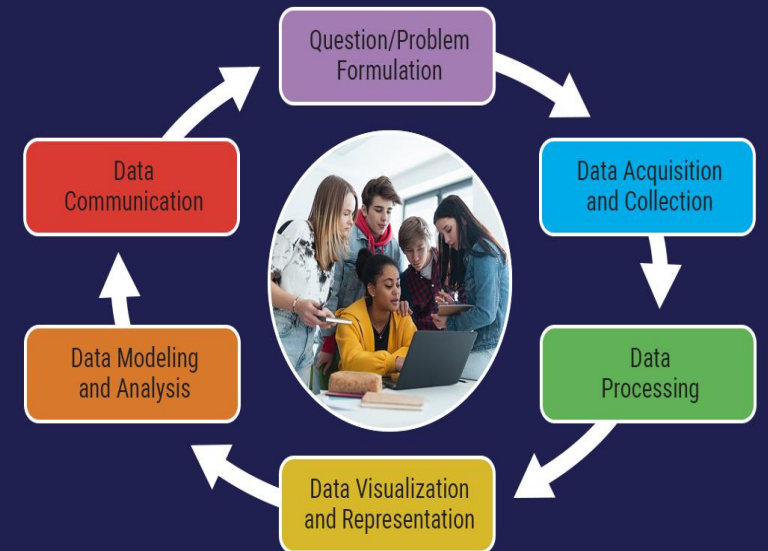
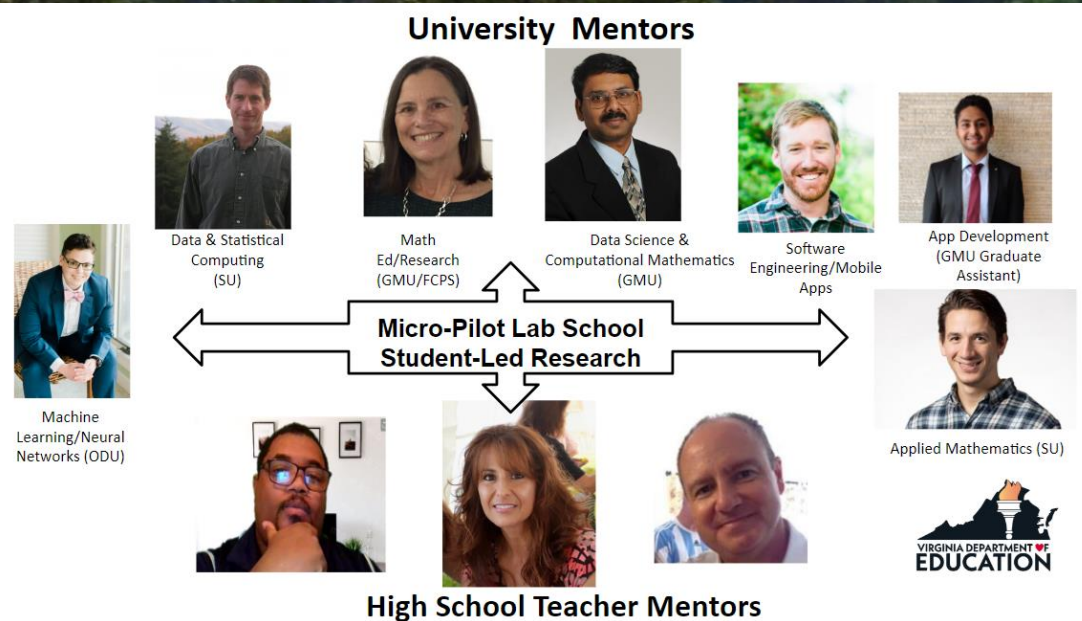
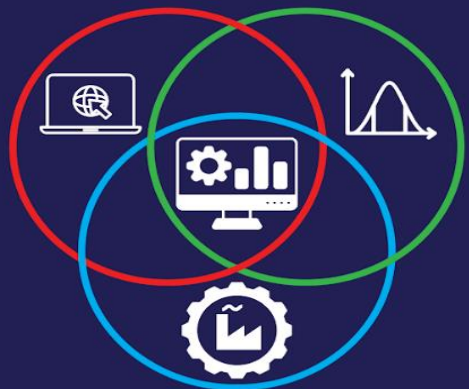
Email: crawford@fcpsk12.net

Web: www.FrederickCountySchoolsVA.net

Inspire 2025: A Promise for Progress

Shenandoah Valley Computer Science Regional Partnership

VIRGINIA DATA SCIENCE



The Shenandoah Valley Rural Regional College Partnership Laboratory School for Data Science, Computing and Applications

Coordinating Higher Ed



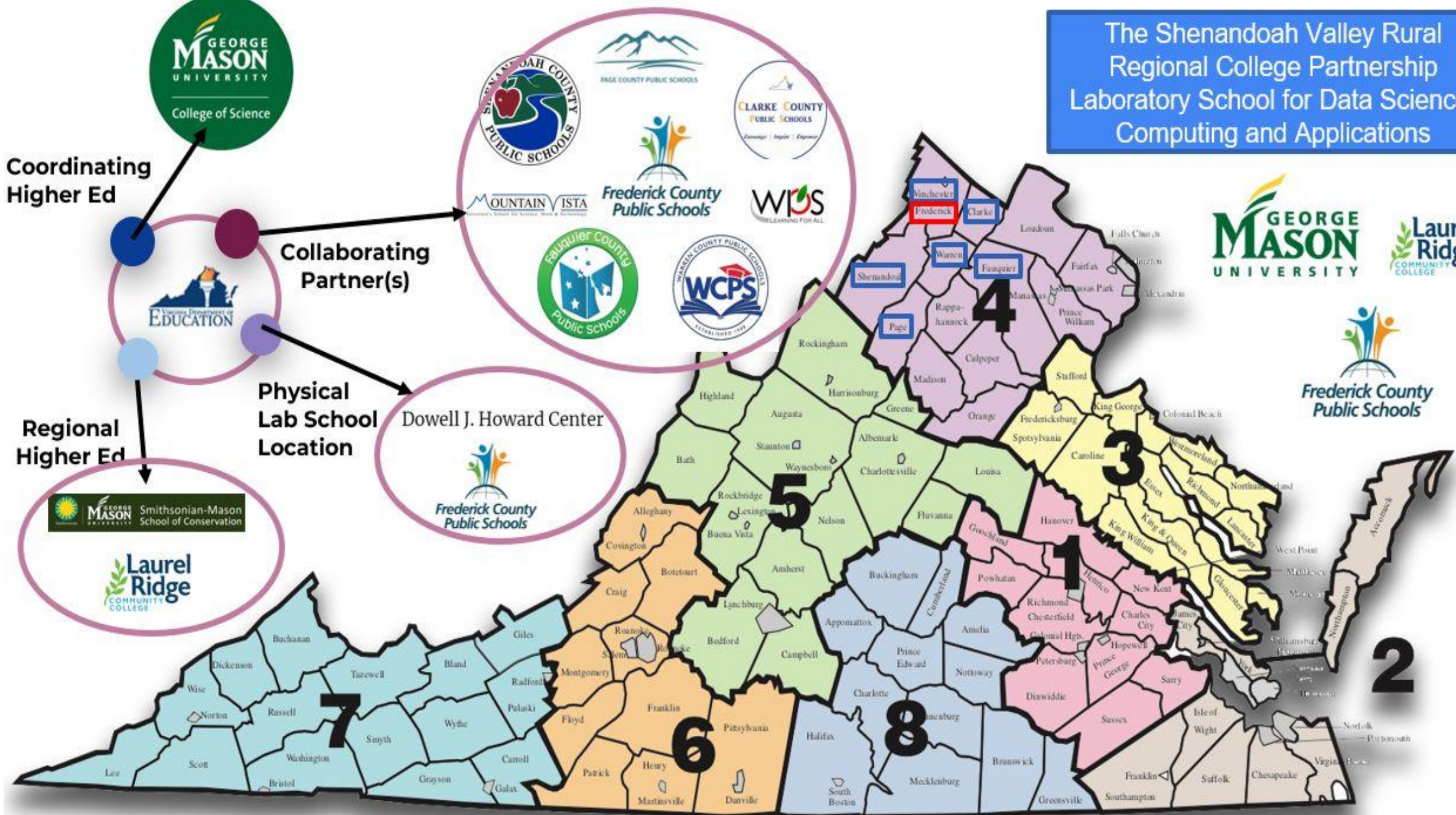
Collaborating Partner(s)



Regional Higher Ed



Physical Lab School Location



Why Data Science, Computing and Applications?

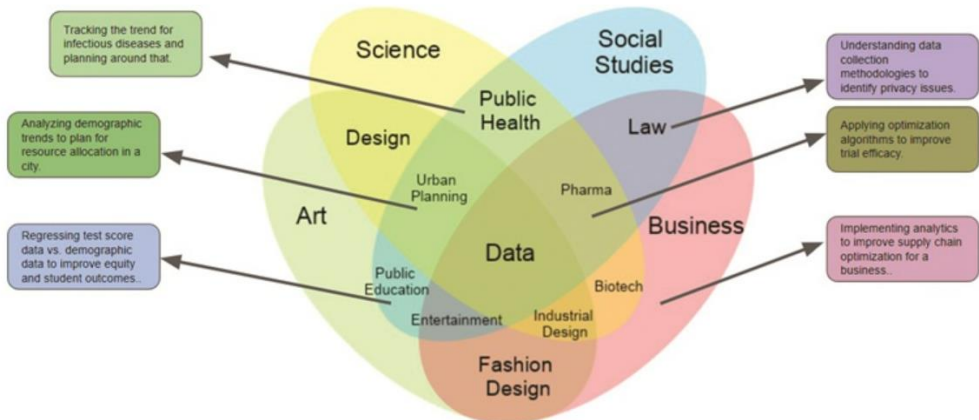
SIAM NEWS APRIL 2022

Students and Education | April 01, 2022

Print

Preparing Virginia's Students for New Post-secondary Pathways in Data Science

By Tina Mazzacane, Deborah Crawford, Lisa Bussian, Aanand Vasudevan, and Padmanabhan Seshaiyer



Teaching Data Science in High School: Enhancing Opportunities and Success



NATIONAL COUNCIL OF
TEACHERS OF MATHEMATICS

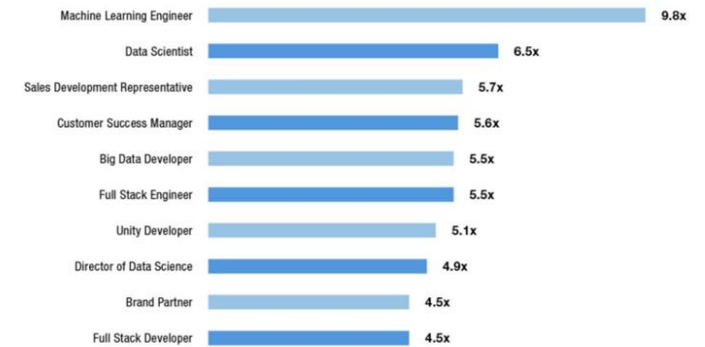
Employers are Desperate to Find People with Data-Related Skills



UNITED STATES
40%

of U.S. companies report difficulty in filling positions because of a lack of STEM skills.¹

Top 10 Emerging Jobs

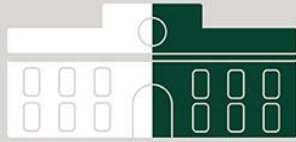


Why Shenandoah Valley?



Nearly one in five
U.S. students attend
rural schools.

In 12 states:



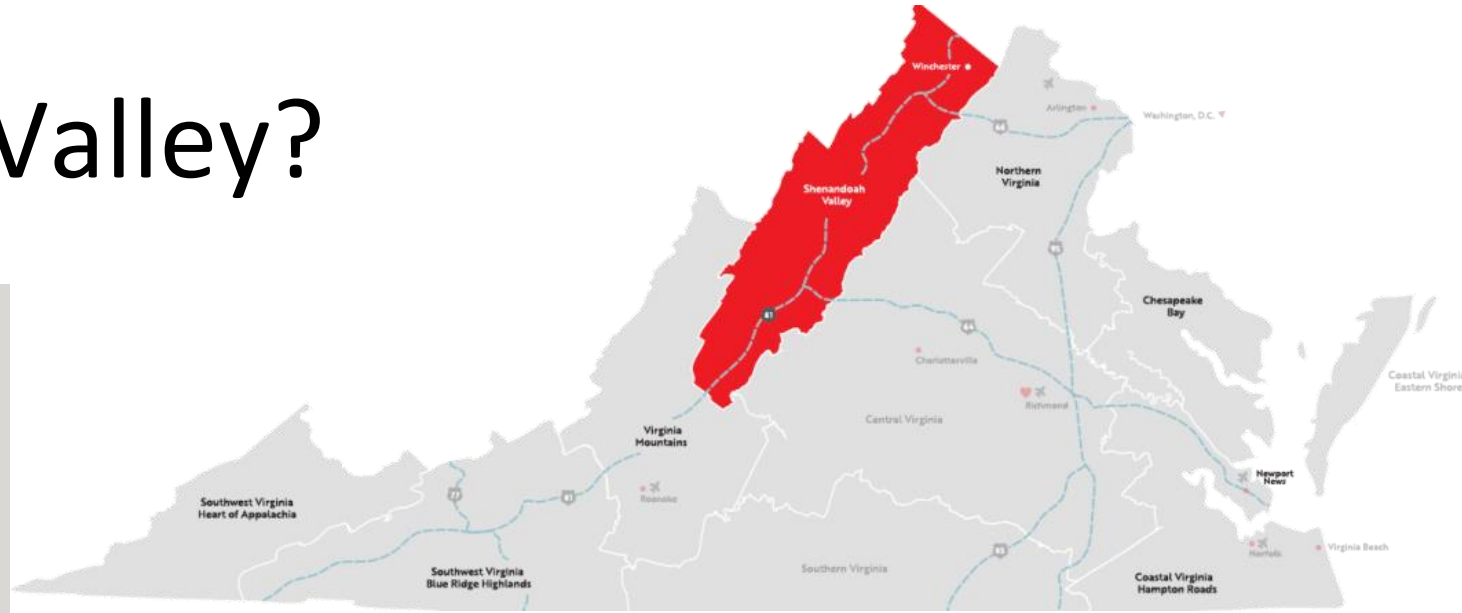
half of public schools
are rural:

- Montana
- South Dakota
- Vermont
- North Dakota
- Maine
- Alaska
- Oklahoma
- Nebraska
- Wyoming
- New Hampshire
- Iowa
- Mississippi

About

1/2

half of rural students in U.S.
live in 10 states: Texas has the
most (694,000), followed by
North Carolina, Georgia, Ohio,
Tennessee, New York, Penn-
sylvania, **Virginia**, Alabama,
Indiana.



The Missing Millions

Democratizing Computation and Data to Bridge
Digital Divides and Increase Access to Science
for Underrepresented Communities

October 3, 2021

NSF OAC 2127459

*We are aiming to amplify and
elevate the voice of rural
educators while providing
access to resources that support
educators in engaging youth in
planetary science and STEM.*



How is the Lab School different for our students?

1

Conduct Mentored Research

Innovations lab course in 10th-12th grades with university mentors

2

Take Courses for College Credit

Take advanced courses in Data Science II, Computer Science II and Science for college credit

3

Earn Data Analytics Certification

Learn data-analytics-focused certifications through companies such as Google and Amazon in a state-of-the-art Data Hub.

4

Multiple graduating options

Earn college credits, have options for an associates degree and or a workforce apprenticeship



14 Grand Challenges for Engineering in the 21st Century



Earn college credit during high school



Associate's



Degree

Multiple Layers of Innovation

Accessibility

Many digital badge and micro-credential programs are available online, making them accessible to individuals regardless of their location or schedule. This accessibility democratizes education and allows more people to participate in skill-building activities.



Customization

Institutions and organizations can tailor digital badge and micro-credential programs to specific needs and interests. This customization ensures that learners acquire relevant skills that align with their career goals or organizational requirements.

Stackability

Digital badges and Micro-Credentials are often designed to be stackable, meaning that learners can earn multiple badges or credentials over time, gradually building their expertise and qualifications.

Day-in-the-Life

Data Science & Computing Applications Lab School Student

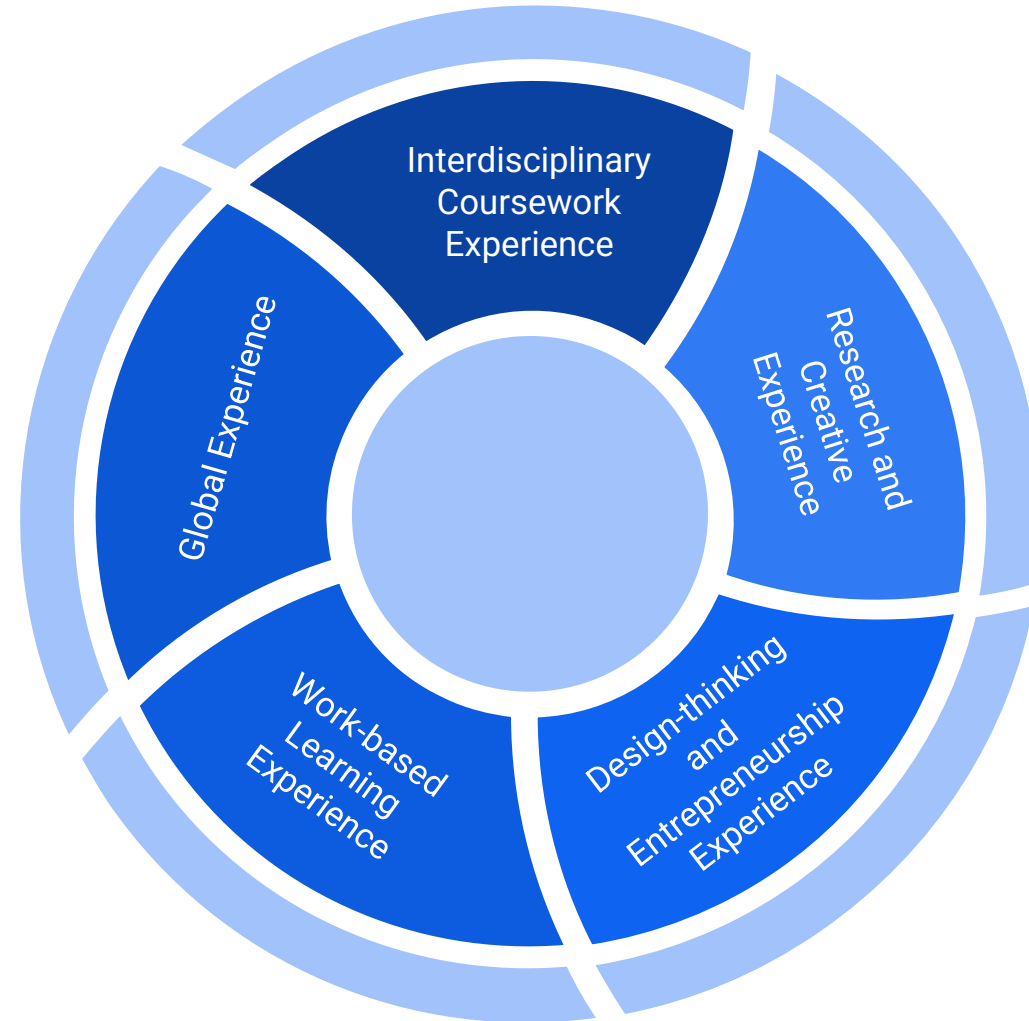
*Dual-enrollment credit**; *University credit***; *Industry certification****

Travel from the Base School
7:30-8:15 am (varies)

	11th Grader (Modified A/B)	12th Grader A/B Day	12th Grader A/B Day
Block 1 (A/B) (100 minutes)	Data Science I /Science	Data Science II* /Science*	SMSC: WBL Elective: University Research, Apprenticeship with Smithsonian Scientists**
Block 2 (A/B) (100 minutes)	English/SS	English/ Government	
Lunch 30 min.			
Block 3 50 min.	Data Hub: CS	WBL Electives (Choice of 2/sem) 1.University Research**, 2. Apprenticeship 3.CS II** 4. Data Analytics Certificate***	Data Hub: CS II** and Data Sci II*
Block 4 50 min.	Elective: University Research Class** or World Language		English/ Government

Travel back to the Base School
2:00-2:30pm

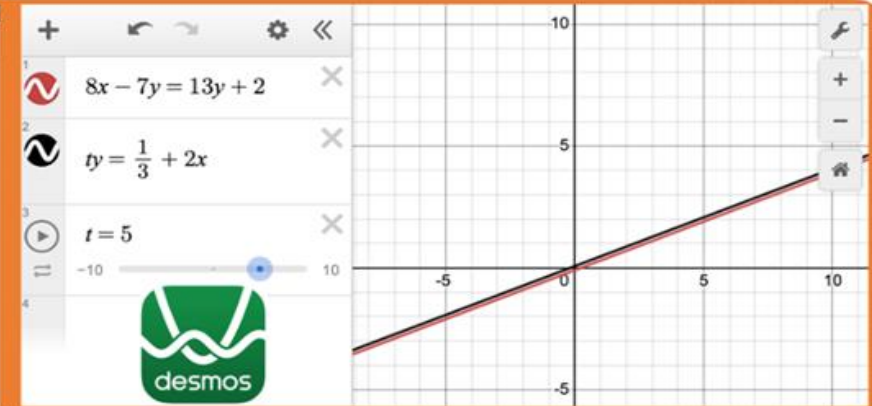
Students can participate in sports, clubs, etc. and take bus transportation home.



CODAP
Common Online Data Analysis Platform (CODAP)
Open-source software for dynamic data exploration
For Educators For Developers
CODAP is free educational software for data analysis.

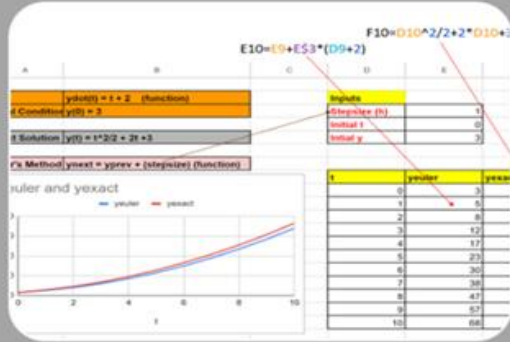
No-Code

- DESMOS
- CODAP



Low-Code

- CODAP
- Google Sheets



Animals Dataset - 1.5.1

Item	Name	Species	Sex	Age (years)	Hired	Legs	Weight (lbs)	Time to Adoption (weeks)
1	Scalia	cat	female	1	false	4	6.9	3
2	Shuffles	tabby	female	3	true	4	3.6	8
3	Shuffles	cat	female	2	true	4	7.4	1
4	Bumflow	cat	female	8	true	4	8.1	8
5	Felix	cat	male	16	true	4	9.2	5
6	Shelba	cat	female	7	true	4	8.4	6
7	Willie	bird	female	0.8	false	0	0.1	8
8	Enders	cat	female	2	true	4	6.3	8
9	Wade	cat	male	1	false	4	3.2	1
10	Hercules	cat	male	3	false	4	15.4	2
11	Taggie	dog	female	3	true	4	4.8	1
12	Boo-boo	dog	male	11	true	4	12.3	24
13	Pink	dog	male	4	true	4	8.2	3
14	Kidogit	dog	female	8	false	4	7.2	4
15	Box	dog	male	1	false	4	28.9	8

Google Sheets IF, AND, OR, IFS formulas with examples

File Edit View Insert Format Data Tools Extensions Help

100% \$ % .00 123 Courie... - 12 +

E4 =IF(AND(D1>0,D2>0,D3>0),SUM(B2:B3),"Nothing")

Month	Invoices		
1	January	\$5,000.00	2
2	February	\$6,000.00	5
3	March	\$4,500.00	6
4	April	\$7,200.00	\$60,900.00
5	May	\$3,800.00	
6	June	\$4,700.00	
7	July	\$5,100.00	
8	August	\$6,300.00	
9	September	\$4,800.00	
10	October	\$5,800.00	
11	November	\$3,200.00	
12	December	\$4,500.00	

High-Code

- Python
- R

```
import numpy as np

x_min = 0
x_max = 1
y_min = 0
y_max = 1

def f(x):
    return sqrt(1 - x ** 2)

def monte_carlo(f, n):
    area = (x_max - x_min)*(y_max - y_min) # Area of the rectangle
    s = 0 # Success counter
    for i in range(n):
        rx = np.random.uniform(x_min, x_max)
        ry = np.random.uniform(y_min, y_max)
        if ry <= f(rx):
            s += 1
    return s * area/n
```

Untitled2.ipynb

File Edit View Insert Runtime Tools Help All changes saved

+ Code + Text

print("Hello World!")

Hello World!

python + colab

R environment

R script

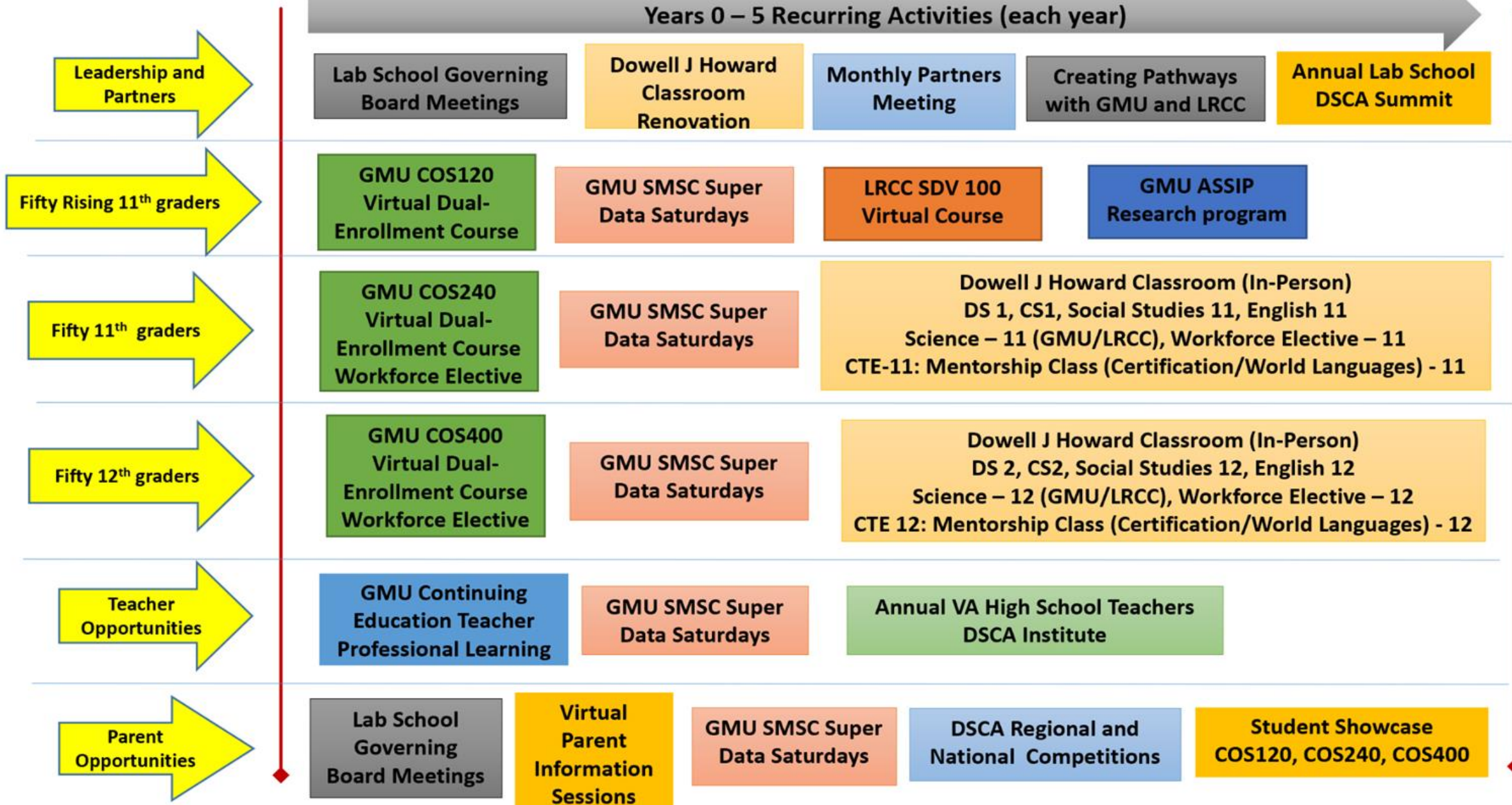
R console

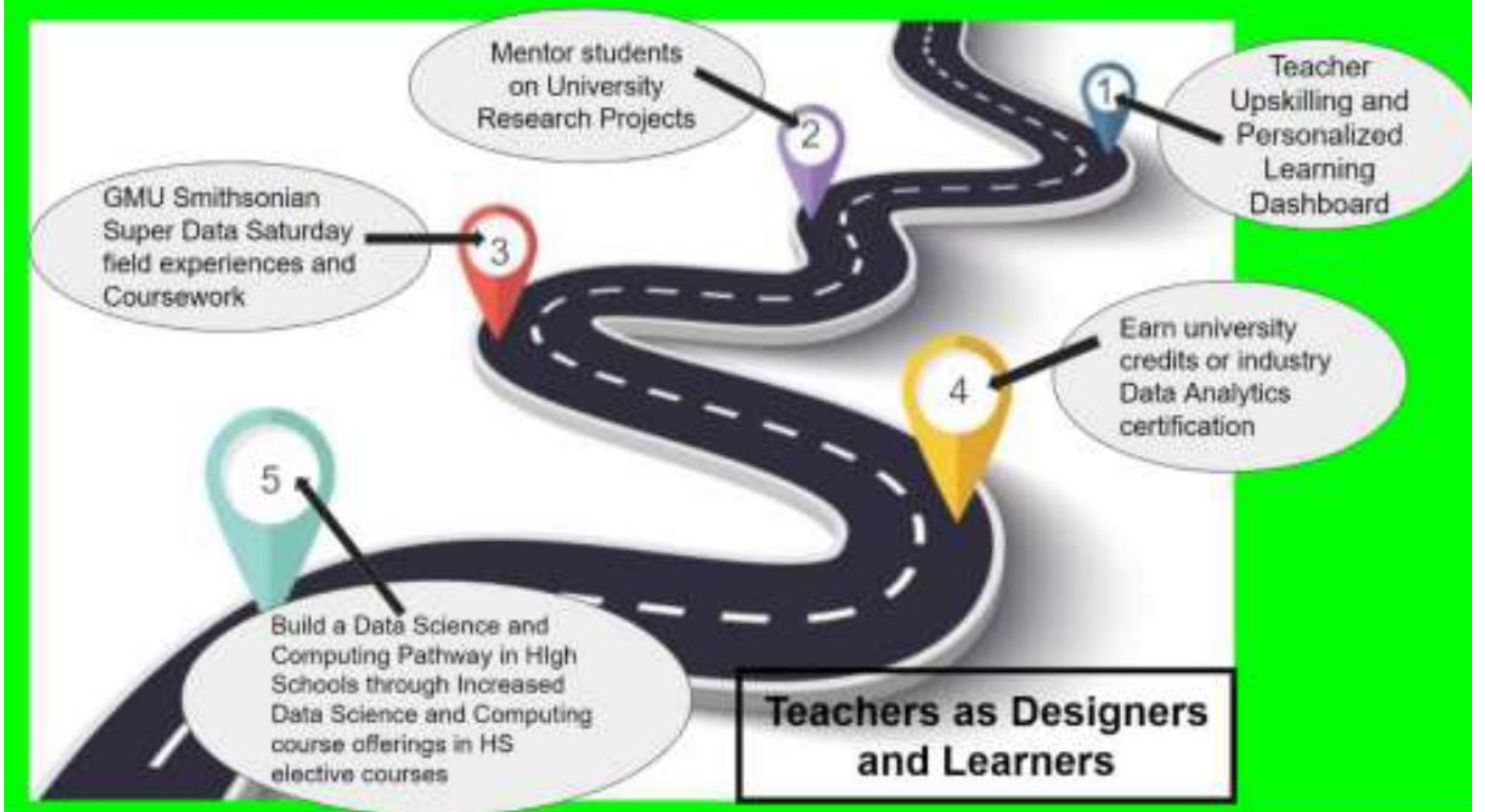
Graphical output

Biomass estimation per plot with different models

Shenandoah Valley Rural Regional College Partnership Laboratory School for Data, Computing and Applications

Years 0 – 5 Recurring Activities (each year)





Sustainability Plan

Financial Resources

- Securing funding is crucial for implementing and sustaining the model. This may include grants, donations, sponsorships, and allocations from both public and private sources.

Political Capital

- Building support from local policymakers, government officials, and education authorities can provide leverage and resources to navigate regulatory requirements and garner additional support for the model.

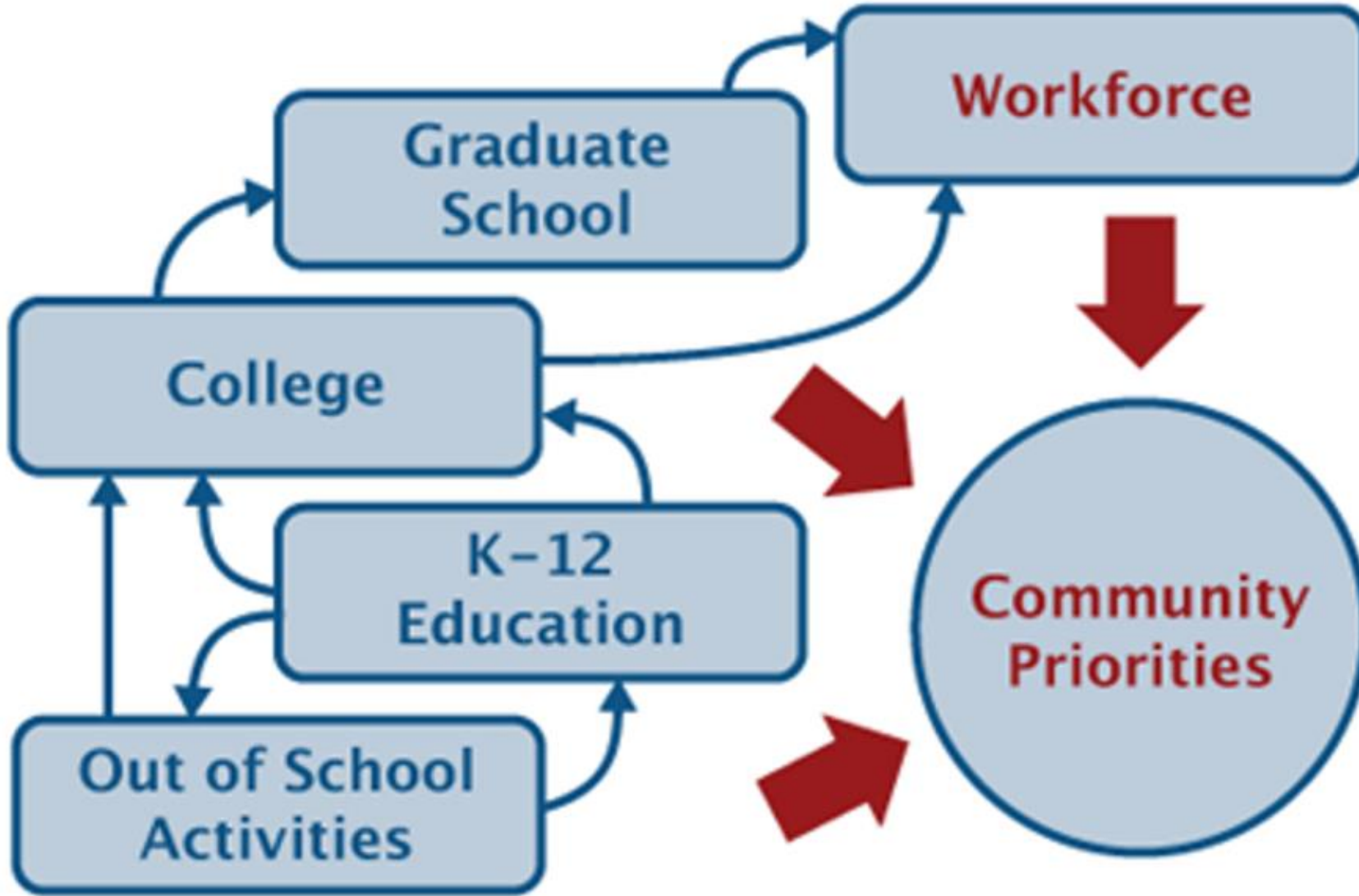
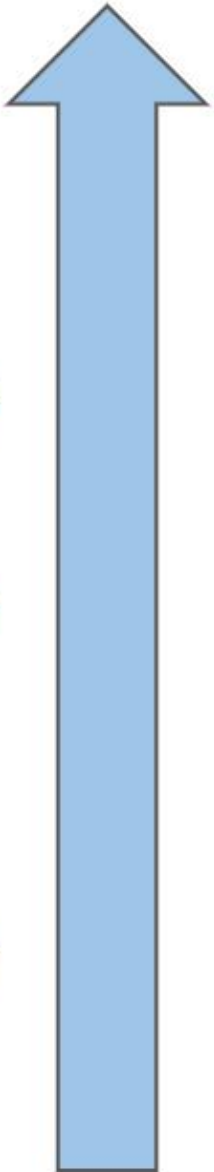
Staff Talents and Interests

- Leveraging the skills, expertise, and passions of staff members within the school community can contribute to the success of the model. Encouraging professional development opportunities and recognizing staff contributions are important aspects.

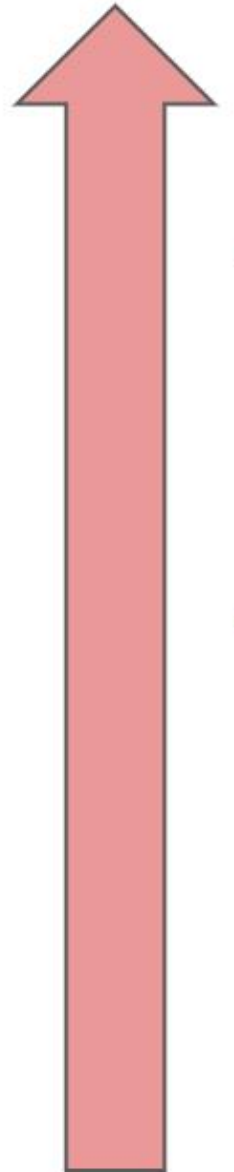


Pathways for Data Science

Interest → Knowledge → Skills → Degree/Certification



Community Projects → Internships → Jobs



Project Contacts



Padhu Seshaiyer, Ph.D.

Professor and Director. George Mason University
Appointee, Virginia STEM Advisory Board, Office of the Governor
Appointee, Virginia Workforce Development Board, Office of the Governor
Chair, US National Academies Commission on Mathematics Instruction
Director, COMPLETE Center, George Mason University

Phone: 8062398738 (c)

Email: pseshaiy@gmu.edu

Web: <http://math.gmu.edu/~pseshaiy>

Twitter: @padhuseshaiyer

LinkedIn: <https://www.linkedin.com/in/padhuseshaiyer/>



Deb Crawford, Ph.D.

Supervisor of Mathematics & World Language
Instructional Services Department
1415 Amherst Street
Winchester, VA 22601

Phone: 540-662-3889 ext. 88133

Email: crawford@fcpsk12.net

Web: www.FrederickCountySchoolsVA.net

Inspire 2025: A Promise for Progress