Celebrating Student Research and Academic Projects at SASH

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BRISTOL, R.I. – At the eighth annual Student Academic Showcase and Honors (SASH) on Wednesday, undergraduate and graduate students shared their academic accomplishments with the RWU community. Students presented academic research, Honors Capstone Projects, panel discussions, arts performances, and other scholarly and creative endeavors.

"One of the most exciting things to happen at a university is the creation of new knowledge," said RWU President Ioannis Miaoulis. "SASH is a day celebrating scholarship for the University. It gives an opportunity for students and faculty to go around and see all the creative work from this year."

For the first time, RWU canceled regular class meetings during SASH to prioritize community participation. Students attended presentations, discussed research, and asked questions of their peers.

"It’s fantastic to see such an incredible variety of projects," said Provost Margaret Everett. "It gives me a lot of pride to see what the students have been able to do this year, and to hear them talk about their passions."

Here is a sampling of the many creative academic projects shared at SASH 2021:
Calibrating an Algal Alert Sensor

Sarina Olson, Junior Electrical and Computer Engineering major from Bristol, R.I., presented her work on improving the design of a submersible fluorometer, a device used to detect dangerous algal blooms. Olson's results found the device to be able to differentiate between two algal groups using light.

Evaluating A Public Health Program

The Bristol Health Equity Zone, a Rhode Island Department of Health initiative to promote local health, made its in-person cooking demonstrations virtual due to the COVID-19 pandemic. Samara Pinto, senior Psychology major from Maynard, Mass., evaluated the virtual cooking program to determine its effectiveness.

She began interning with the Bristol Health Equity Zone in the winter of 2021, and plans to continue her involvement throughout the summer.

"My long-term goal is to work for the Department of Health in Rhode Island, so this was a really neat way to learn about my own community and its needs," said Pinto.
Samara Pinto, senior Psychology major from Maynard, Mass., with her poster "Program Evaluation of the Bristol Health Equity Zone Cooking Demonstrations."

An App For Interactive Digital Presentations

Senior Computer Science majors Nicholas Ferreira, Peter Navarro and Michael Pieper created Varro, an app that expands the function of digital communication. Varro provides more options for interactive video calling, a need the team recognized from the reliance on virtual connection through the COVID-19 pandemic.

"Viewers can focus on a part of the screen, zoom in, or tell the presenter to speak up non-verbally. The key purpose is to make digital presentations and communication more fluid, less clunky, and more personable," Ferreira said.
"In the software development world, you are always working in a team, coding for two weeks, meeting, seeing how everything runs, and going from there. Spending a full year on a project with the same group of people is what we would do in the workforce. Instead of just being given directives and having to follow them to the T, we had to decide how we would create what we did, so I think this is a very applicable project," said Pieper.
Justine Aho, senior Architecture major from Pelham, N.H., presented her Honors Capstone Project, “Center of Culture, Creation, and Expression,” a semester-long architectural design studio project in which she designed an arts center in Boston, Mass.

"Going forward, I really want to focus on large projects like this that benefit the public sphere," said Aho. "I want to focus on the diverse groups of people who live in or visit a city, and I think this project really did that. Art is so important, regardless of your background. Whether you are an Architecture major like me, an Engineering major, an Arts major, no matter what you are learning, art is important for developing your cities and creating a sense of
community. This art center encourages people to engage with art and the benefits it provides."

Justine Aho, senior Architecture major, designed this arts center for her Honors Capstone Project, "Center of Culture, Creation, and Expression."

Child Development Through Athletics

Senior Educational Studies major Sebastian Suarez, from West Hartford, Conn., is on the path to becoming an Athletic Director. He researched the benefits of exercise for middle-school aged children and designed an athletic program to keep them moving.

"I was wondering what happens to students in the lower grades, who are in such a crucial developmental stage, when they have to do remote education. A lot of them are just in front of their
computer screens all day, not really doing anything else," said Suarez. "Exercising helps them wake up their brain and help them focus on their task at hand."

He designed five 15-minute workout videos to be shared through Google Classroom to meet exercise requirements and improve student motivation.

"Down the line, I hope to implement this program in the school I work for," said Suarez.

Suarez will attend Rider University's Masters in Athletic Leadership program after graduating.

Senior Educational Studies major Sebastian Suarez, from West Hartford, Conn., with his project "Exercising In a Covid-19 World."

A Pizza Delivery Robot
Senior Engineering Majors Tim Beaulieu, Joe Gaudio, Joseph Hogan, Eamon McKenney and Logan Souza developed a "Pizza Delivery Robot," a machine capable of securely driving a full pizza across campus, for their Senior Design project. They set up their robot on the Library Quad to provide demonstrations for curious spectators.

Reducing Cybercrime Targeting College Students

Senior Criminal Justice major Natalia Villareal, from Feeding Hills, Mass., wanted to help her peers reduce their risk of cybercrime victimization through education.

For her Honors Capstone Project, Villareal researched the online habits of college students, and studied the effects of preventative measures on reducing crime risk, along with the impact of cybercrime on her community.
"I really was able to begin to understand the vulnerabilities of the college population in terms of cybercrime victimization," said Villareal. "I was able to understand the ways they expose themselves on a daily basis and the ways this contributes to them feeling unsafe online. I really want to draw attention to the fact that people might not even realize the ways they are exposing themselves. They might not understand that their data is vulnerable. It is my hope that bringing awareness to this type of thing will help mitigate this risk."

Senior Criminal Justice major Natalia Villareal, from Feeding Hills, Mass., presents her Honors Capstone Project "Fear of Cybercrime and Victimization."

Advising Young Investors
Senior Finance and Economics major Emily Gildea, from Palos Park, Ill., presented her Honors Capstone Project "Educating Retail Investors in a Volatile Market."

While working last summer in RWU's Center for Advanced Financial Education (CAFE,) Gildea got first-hand experience investing real money in 2020's unpredictable stock market. She began to wonder why so many new investors were entering the market while it was responding to the pandemic, and set out to answer this question through her research.

"I wanted to be able to educate the people I am surrounded by. I am a young investor, and a lot of people in my classes are as well. I wanted to be able to break down what happened in 2020 so that people could understand it and have a better idea of what to do in the market moving forward, and to make better educated decisions about their investments," said Gildea.
Senior Finance and Economics major Emily Gildea, from Palos Park, Ill., presents her Honors Capstone Project "Educating Retail Investors in a Volatile Market."

Showcasing Music

The day ended with SASH's Music Showcase, where student musicians shared their talents with the campus community.

Sophomore Music and History major Lindsey Whitehead, from Glenview, Ill., performed Sonata No. 1 in F Minor, Op. 2, No. 1, I. Allegro by Ludwig van Beethoven on the piano.

"Beethoven is a very intimidating composer who creates equally intimidating works. What’s written on the page and technique can only bring you so far when playing a Beethoven sonata. You have to have
to approach it with passion and gusto," said Whitehead.

Senior Communication & Media Studies major and Music minor Zuri Soto, from Shelton, Conn., chose to sing "Corner of the Sky" from the musical *Pippin* due to its emotional content and her connection to the piece.

"Performing this piece meant a lot to me as a senior because it was able to capture my personal journey while having an emphasis on my future goals. Even though I have accomplished a great deal during my four years at Roger, I am prepared to use my talents and knowledge in the next chapter of my life," said Soto.

SASH 2021

Previous
COVID-19 Pandemic Volterra Integral Equation

Introduction

The COVID-19 pandemic has become a global crisis, affecting the health and economy of many countries. In this study, we use the Volterra integral equation to model the spread of COVID-19 in the United States. The equation is given by:

\[ \int_0^t K(t-s) \psi(s) \, ds = x(t) \]

where \( x(t) \) represents the number of infected individuals at time \( t \), and \( K(t) \) is the kernel function. The kernel function can be chosen to reflect the transmission rate of the virus.

Volterra Integral

The solution to the Volterra integral equation is given by:

\[ x(t) = \psi(t) + \int_0^t K(t-s) \psi(s) \, ds \]

where \( \psi(t) \) is the initial condition.

Numerical Results

The numerical results of the model are presented in the following table:

<table>
<thead>
<tr>
<th>Time (days)</th>
<th>Infected Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>100</td>
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<tr>
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</tr>
<tr>
<td>3</td>
<td>250</td>
</tr>
</tbody>
</table>

Conclusions

The model provides a good fit to the data, indicating that the Volterra integral equation is a suitable tool for modeling the spread of COVID-19. Further research is needed to improve the accuracy of the model.

Assumptions and Challenges

The model assumes that the transmission rate remains constant, which may not be the case in reality. Additionally, the model does not account for the impact of public health interventions.

Patient Model

In the future, the model will be extended to account for the impact of public health interventions, such as social distancing and vaccination.

References

Project management

- Weekly meetings
  - Agenda
  - Meeting Minutes
  - Gantt Chart
  - Action Items
- Google Drive
- Communication and Organization
Fireflies, Frogs, Owls, Trees, and More: The Importance of Nature Exploration With Children

By: Courtney Cassette; Dual Majors: Educational Studies & English Literature

Introduction

Purpose

The purpose of this project is to explore the benefits of nature exploration for children. This is achieved through the development of an educational program that incorporates nature-themed activities and stories.

Methodology

The methodology involves collecting data through surveys and observations of participating children. The program is designed to foster a connection with nature and to educate children about the importance of conservation.

Conclusion

It was found that the children who participated in the program showed increased interest in nature and were more likely to engage in environmentally friendly behaviors. The program also had a positive impact on their emotional well-being.

Future Directions

The program is open to continuous improvement and expansion. Future directions include the incorporation of more interactive elements and the development of a community outreach program.
COVID-19 Pandemic Volterra Integral Equation

**Introduction**

The COVID-19 pandemic has impacted the world in unprecedented ways. As a result, there is a need for robust mathematical models to understand the spread of the virus. In this research, we employ the Volterra integral equation approach to model the COVID-19 pandemic. The equation incorporates the rate of infection, recovery, and death rates, allowing for a comprehensive analysis of the pandemic's progression.

**Volterra Integral Equation**

The Volterra integral equation is given by:

\[ u(t) = f(t) + \int_{0}^{t} K(t-s)u(s)ds \]

where \( u(t) \) is the number of infected individuals at time \( t \), \( f(t) \) is the source term, and \( K(t-s) \) is the kernel function.

**Volterra Integral Equation Solution**

The solution to the Volterra integral equation can be obtained using the Laplace transform. The Laplace transform of the equation is:

\[ \mathcal{L}\{u(t)\} = \mathcal{L}\{f(t)\} + \mathcal{L}\{\int_{0}^{t} K(t-s)u(s)ds\} \]

This leads to:

\[ \hat{u}(s) = \hat{f}(s) + \int_{0}^{s} \hat{K}(s-t)\hat{u}(t)dt \]

**Numerical Results**

The numerical results are presented in the following table:

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<td>2</td>
<td>140</td>
</tr>
<tr>
<td>3</td>
<td>160</td>
</tr>
</tbody>
</table>

**Conclusion**

The model provides a valuable tool for understanding the spread of COVID-19 and can be used to predict future trends. Further research is needed to refine the model and incorporate real-world data for improved accuracy.

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