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2022 CONFERENCE PROCEEDINGS



CULTIVATING ENSEMBLES

EXPLORING ACROSS STE{A}M

Edited by Jaime E. Martinez, Barbara J. Natalizio, and Omar H. Ali

*“The ideal history professor is one
who can talk about music, science,
and art, as well as political events.”*

LeVell Holmes, Ph.D., Sonoma State College, 1968

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Welcome! Come on, let's play!

Raquell M. Holmes, Ph.D.

It is a joyous experience to be creating environments in which we can all grow. The Cultivating Ensembles scientific-humanistic-artistic-activistic conferences and community are inviting you to bring you and your work to play with us.

In 2010, the idea of improvisation and performance being relevant to science and computing fields was still novel and weird in most contexts. I was looking for people who were transforming their classrooms, putting development ahead of content and concepts, and finding ways to make visible the cultural, the personal and the subjective aspects of our work in the sciences. I

was looking for people who were living and working in the blurry spaces around performance, science and education. What could we discover by coming together and sharing our work with one another?

Central to our coming together is a commitment to building with the people who come to play with us. Each Cultivating Ensembles conference is unique—shaped by the people who organize, present and attend. We come to the conference with different relationships to the words “play, perform, community, science, theater, and art.” And we discover that we have been helped, inspired and rejuvenated by building with these different lenses and experiences of people who are “not like us.”

I am amazed and grateful to see Cultivating Ensembles become a community activity in which participants are transformed and informed by giving their dreams to one another. The conference has grown beyond me. It is now led by others. The participants are increasingly people that I am meeting for the first time at the conference. The presentations are part of the grassroots activism that relates to people as creators of our cultures, of how we share and learn.



Their content speaks to my heart. They touch the ache of having felt alone in seeing culture (our best and worst) in science labs, and I love each person who comes.

Each one, presenter or attendee, brings something complex and innovative, new questions and possibilities. Together we are creating, as performers, a new stage for academic research and education. It is a stage on which we all belong, and we all create.

“Together we are creating, as performers, a new stage for academic research and education. It is a stage on which we all belong and we all create.”

RMH

What is Cultivating Ensembles?

Jim E. Martinez, Ph.D. and Barbara J. Natalizio, Ph.D.

Co-Convenors

How do artists, dancers, improvisers, and designers create trans-disciplinary, inclusive communities with colleagues in science, technology, engineering, and mathematics (STEM)? How do scientists, engineers, technologists, physicians, and



mathematicians inspire the artistic process? *Now imagine creating a space without such boundaries or labels.*

The Cultivating Ensembles (CE; formerly CESTEMER) community gathers people who create compelling learning environments by deeply engaging across the arts, humanities, and sciences. Activities include bi-annual conferences and, more recently, Coffee Chats. CE builds a unique professional development environment where

innovators learn from one another's practice and celebrate the interwoven nature of sciences, technologies, humanities, and arts as human activities. People imagining, creating, and exploring the world together is at the heart of science, technology, engineering, mathematics, medicine, and the multitude of arts.

We hosted Cultivating Ensembles 2022 as a virtual conference on November 10th and 11th, 2022. We were thrilled to welcome our keynote speaker Dr. Quincy K. Brown, Director of Space STEM and Workforce Policy at the National Space Council in the Office of the Vice President of the United States and our plenary speaker Dr. Omar Ali, Dean of Lloyd International Honors College at the University of North Carolina at Greensboro.



We deeply appreciate our co-sponsors: improv**science**, Lloyd International Honors College at the University of North Carolina at Greensboro, and RideFlyView. We also are indebted to our volunteers who are passionate about what we can learn and create together in the arts, humanities, and STEM. We are excited to present this volume that highlights the amazing work presented at Cultivating Ensembles 2022. As you will see, this proceedings is unique in that it is a compilation of presenters' reflections about their experience presenting at CE 2022. We asked presenters to reflect on their experience of CE with the following prompts as a guide:

- *What was your experience of creating an inclusive, interactive space at CE 2022?;*
- *What resonated with you the most as you were presenting at CE 2022? Please share any highlights that made your experience unique in comparison with other conferences at which you have presented; and*
- *What impact has attending Cultivating Ensembles had on your work and/or perspectives?*

We hope that you enjoy reading about the work of our presenters and that it inspires you to learn more about our community. We would love for you to come build with us and share in the experience of CE! Find out more about our community and previous gatherings at www.cultivatingensembles.org. If you are interested in helping us plan new activities for our community and joining the CE Organizing Committee, please email us at info@cultivatingensembles.org

With sincere appreciation for those who have created and will create together with us in the future,

JEM & BJN

Keynote Speaker: Quincy K. Brown



Dr. Quincy K. Brown is the Director of Space STEM and Workforce Policy at the National Space Council in the Office of the Vice President of the United States. Previously, she worked as a Senior Policy Advisor in the White House Office of Science and Technology Policy where she focused on STEM Equity, Education, and Workforce Policy. Prior to that, Quincy was the Head of Programs at AnitaB.org, a global organization dedicated to the development of women technologists. Quincy is cofounder of blackcomputeHER.org, a nonprofit organization focused on supporting the advancement of Black women and girls in computing and technology in education and in the workforce.

She was previously Program Director for STEM Education Research at AAAS where she focused on pre-service STEM teacher education, innovation and entrepreneurship. She has also served in the Obama Administration as a Senior Policy Advisor and a AAAS S&T Policy Fellow as the NSF focused on CS and STEM Education. For six years she was an assistant professor of computer science at Bowie State University. There she conducted HCI research and examined the design of intelligent tutoring systems and the design and usability of mobile devices and use of mobile devices in emergency situations by first responders. She completed her PhD as part of the Vision and Cognition Lab of the CS Department at Drexel University in Philadelphia, PA. While completing her doctoral studies, she was a National Science Foundation GK-12 Fellow and a Bridges to the Doctorate Fellow. As a GK-12 Fellow, she taught and developed STEM curricula for middle school students. Quincy began her career in industry as a test ad software quality engineer at Nokia, NEC, and Raytheon. Her research has been supported by Google, DOD, DHS, and the NSF.

Plenary Speaker: Omar H. Ali



Omar H. Ali is Dean of Lloyd International Honors College at the University of North Carolina at Greensboro. A historian of the global African Diaspora, he infuses performance and play into the culture and curricular offerings of his campus through workshops in improvisation, interdisciplinary course offerings, and programming that emphasizes the power of play and practical philosophy in people's learning and development. A graduate of the London School of Economics and Political Science, with a Ph.D. in History from Columbia University, he was named Carnegie Foundation North Carolina Professor of the Year.



CE 2022 Plenary Session

Storytelling from the Frontlines:

Theatrical performances from conversations with frontline health workers

*Marion Leary, R.N., Ph.D., University of Pennsylvania
and Christina Eskridge, M.P.H., Elevate Theatre Company*



Leveraging the work of a professional theater company, the University of Pennsylvania School of Nursing partnered with Elevate Theatre Company, LLC to create a series of digital plays telling stories of our frontline health workers. The Frontline Health Workers Digital Theater Project used the viewpoint of nurses, physicians and those working in the hospital but not necessarily with patient-facing roles (e.g., transport, supply managers) as inspiration for two theatrical

performances created by experienced playwrights and performed by professional actors.

First, Elevate facilitated two 90-minute storytelling workshops led by professional teaching artists, with frontline workers from Penn Nursing and Penn Medicine. The workshops leveraged applied theater techniques to engage frontline health workers in theater games, storytelling, and written activities to promote reflection, play, and collaboration among the participants. Following the workshops, the playwrights began building theater pieces reflecting their observations and the stories shared in the workshops. Penn Nursing supported the creative process by providing clinical accuracy checks and additional information about frontline health workers' experiences as requested by the playwrights.

Each of the theater pieces ran about thirty minutes followed by a forty-five-minute panel discussion. The discussions focused on the theme of each play, which included COVID-19, provider burnout, and racial injustice. Panelists were health workers with expertise in the topics, the playwrights, and a diverse representation of the healthcare workforce.

The goal of the Frontline Health Workers Digital Theater project was (1) to engage our frontline workforce in storytelling to support them in expressing, engaging, and reflecting on their experiences around COVID-19; (2) to give audiences an opportunity to see how their individual choices impact our health systems and our frontline workforce; and (3) to leverage artistic storytelling to help the public at large to engage with and understand frontline experiences.

The plays were presented in the Spring of 2022 virtually due to the pandemic. All were free and open to the public.

Our session included a didactic component, sharing an explanation of the collaboration between Penn Nursing and Elevate. The audience was invited to share their own stories through the same theatrical

storytelling framework we used during the theater workshops. A professional teaching artist led participants in using gesture, text, and music to share their stories and provide a hands-on experience of how the stories from the frontline health workers were captured and how the plays were constructed.

We hope the participants came away with a better understanding of how theater arts and healthcare can collaborate in order to tell stories of frontline health workers and how they could create a similar partnership at their institution. We really enjoyed the CE ability to bring together folks from all different disciplines—science, education, arts. It felt very inclusive from the various points of view. And we are so grateful that the participants were game to actively participate! This is extremely rare and unique, as other conferences are sometimes heavy on the didactic presentation style.

It has been wonderful to learn more about how our work in the theater arts and healthcare can be applied in different fields, and there have been opportunities to potentially collaborate with others since the CE conference.

***“It was a wonderful,
interactive experience
... the audience was so
open and willing to
engage!”***

Seeing Birds and Biodiversity through Science and Art

Bryan Wang, Ph.D.

Pennsylvania State University

Maintaining biological diversity—safeguarding the variety of living things on earth—is essential for the health of the planet and humanity’s well-being. To engage the public with local biodiversity—specifically birds—we have developed a program that combines science and the arts as complementary ways of experiencing nature. Guided by area birders, participants engaged in a group birdwatching experience. Then, over the subsequent four weeks, they watched birds on their own, wrote reflections, and created visual representations of the birds and birdwatching.



“I learned about crossing disciplinary fields and, yes, cultivating them—to grow new ideas, projects, and relationships.”

The integration of experiences, as manifested in field notes, artwork, and writing, reinforced an understanding of as well as interest in birds and their natural habitats among those who participated. In short, participants gained a deeper appreciation for the natural world when seeing it in the contexts of both science and creative expression.

It was a pleasure to join this smart, energetic, diverse, interesting, and fun (!) ensemble at the Cultivating Ensembles conference. I saw old friends and met new ones. My presentation was graciously received by a friendly and engaged audience and I learned about crossing disciplinary fields and, yes, cultivating them—to grow new ideas, projects, and relationships. Because of Cultivating Ensembles, I’m now part of the Biology through Art collaborative network and proceeding full STEAM ahead toward new interdisciplinary ventures.



Embodied Wireframe for Middle School Science Educators

Muneeb ur Rehman

This lightning talk presented an embodied wireframe for science educators aiming to cultivate a creative yet critically exploratory attitude in the experience of middle school science curriculum. A facilitators' framework was presented that devised a series of dramatic scenarios that introduced and helped to springboard students into topics of Force, Diversity of organisms, Ecosystems, and Scientific attitude from the point of view of lived human experience and imagination. Drawing from hybrid influences of Jonathan Neelands' Process Drama and Augusto Boal's Forum theatre, the framework treated 'topics' from the curriculum planning stage as living modular nodes with fluid overlappings through exploration with dramatic devices. The particular framework had three layers of community generation built into its design, one at the level of students; second, at the level of teachers; and, third, teachers and students combined. Spanning over the four-month period of a term, informatics of the particular topics were structured around dramatic devising and reflections that led up to

“My interactions opened the door to a whole range of new interdisciplinary possibilities that, I believe, will render science education richer and more human.”

personally and collectively derived actions. A particular consideration was in facilitating science educators who do not have a strong background in performance.

Cultivating Ensembles provided focused attention on the experience of design and implementation of science pedagogy through play-based methods. I was enlivened to share with conference participants the process side of enabling science pedagogy as a more open-ended and personally engaging experience for middle school students and teachers. Following my Share Fair presentation, the round of questions and reflections made me think about the 'embodied wireframe' for science educators in a more clinical and precise way, for which I'm very grateful.

A highlight was the sharing of personal research interests by conference participants, which allowed for stimulating new conversations and possible future collaborations. My interactions opened the door to a whole range of new interdisciplinary possibilities that, I believe, will render science education richer and more human.



Collective artwork produced in between sessions led by Nick Gross

Using Publicly Available Resources for Teachers' Professional Development: Artists as Co-facilitators

*Minkie O. English, M.P.A.
Ronin Institute*



Most teachers' professional learning environments are not typically artist-led with opportunities for dramatic expressions or visual experimentation as forms, or modalities, of teaching and learning. But what if more learning environments were? Using publicly available resources, such as working artists, co-facilitation can be guided by and between professional development coaches and artists as trainers. The guided co-facilitated training provided participants with creative freedom as didactic work modes that not only centered the trainers but also included the participants concurrently as trainers and not just trainees in the learning environment. This acknowledged and took into account the trainees' pre-existing expertise and potential as prospective trainers. Instead of being a passive learner, the trainees became active participants in the training sessions. For the purpose of the presentation, the creative freedom(s) that were discussed involved the following didactic methods: lecturing, demonstration, field practicals with excursions, group work, and play, with making as a central learning modality. These methods of learning and work lent themselves to past research conducted on the specific features of effective professional development for improvements in student learning outcomes. As such, the presentation focused on work done on-site in New York City at both an educational institution and a cultural

institution, as well as virtually. Findings were not quantitatively measured nor were they qualitatively conclusive, but present the case that effective professional development has several shared features. According to Darling-Hammond, Hyler & Gardner (2017), these features are focused on content that incorporates active learning based on adult learning theory and job-embedded supported collaboration which are modeled by effective practice with coaching and support from experts who provide opportunities for feedback and reflection over a sustained period of time.

To understand the impact that Cultivating Ensembles has had on my work, it is best to first understand why this work is

important to me. For my undergraduate education, I completed all the necessary requirements to prepare to attend medical school, but I opted not to go. Instead, I earned my Bachelor of Science in Psychology with a focus on child development and behavior. With this degree I worked in various administrative capacities within healthcare – focused on psychology and rehabilitative medicine. While doing so I went back to get a

Master in Healthcare Administration, and although I fulfilled the requirements for that degree I opted to get the Master in Public Administration because of my personal interest in education policy. During my time in graduate school, the No Child Left Behind Act was widely popular and discussed throughout the media and in many of the conversations I engaged in. This education reform policy which aimed to close the achievement gap experienced by disadvantaged students through accountability, flexibility, and choice was the focus of my thesis. I had not yet understood why I was simultaneously being led down one path educationally while walking another within the workforce. Despite this lack of insight, I forged ahead anyway.

I see the world and process information through a creative lens. The duality between my personal interest and work obligations continued until I found what bridged the gap

“I am not an artist in the ways the profession is conventionally defined, however, my life and professional career has always required me to be creative. I believe being an immigrant, or migrant, demands one to become creative – acculturation and assimilation compels us to.”

for me – the Arts and Arts Education. Entering the Arts was somewhat of a gravitational pull which removed me from the full-time workforce so I could finally center education and educational interventions in my life and as my career pursuits. However, unlike my past, my education became self-guided and community supported. Over the course of five years, I've been able to self-actualize to bridge my understanding, learning, and work. I am not an artist in the ways the profession is conventionally defined, however, my life and professional career has always required me to be creative. I believe being an immigrant, or migrant, demands one to become creative – acculturation and assimilation compels us to.

“Participating in the Cultivating Ensembles conference was the culminating experience which gave me an interconnected perspective so that I could move forward with my interests, education, and work.”

like I did. It was there where I was introduced to Cultivating Ensembles and where I learned that the parallel path I once thought I was walking had already intersected. However, I had not yet fully bridged the gap between my personal and professional interests. Participating in the Cultivating Ensembles conference was the culminating experience which gave me an interconnected perspective so that I could move forward with my interests, education, and work.

In Summer 2022 I attended a professional development field school and was yet again an outlier in another space – amongst individuals who would have ordinarily been my peers if I pursued my previous path in the Sciences and Medicine after undergrad. It was in this educational setting where I met a few fellow polymaths who understood the endurance required of my journey or who practiced in the world at-large

KreaSach Pro:

A Playful Approach to Algorithms through a Creative Learning Setting with Educational Robots



*Dr. Marisa Holzapfel
University of Greifswald*

*Dr. Nadine Dittert
University of Potsdam*

The aim of the project was to give young students from elementary school access to programming on the one hand and to offer them room for creative development on the other (Hadzigeorgiou et al., 2012). Learning units for two similar robots, namely Blue-Bot and Cubetto, were developed, where children told stories with an overarching theme (for example: "*How does the bee get to the honeycomb?*"). The stories took place on a matrix of prepared jigsaw pieces that could be rearranged and were further designed by the children themselves. Some of the jigsaw pieces were painted with blackboard varnish, so that children could paint any pictures and thus express themselves creatively (Dittert et al., 2021). Stories were told by programming the robots and making them wander around their own story matrix.

The project went beyond storytelling using Cubetto and Blue-Bot with their existing (mostly predefined) story mats. Here, children were free to create their own pathways and obstacles and hence they were allowed to create whole new worlds and to tell new

stories. We wanted to allow children to become creators of completely new stories, that include their ideas, their own objects and actions. Overall, we were interested in approaches that fostered children's creativity using programming and how they could be designed to empower children to express themselves creatively. A mixed-methods approach was used as the accompanying research. Throughout the activity, one researcher wrote an observation protocol. Further, a short pre-post questionnaire was included on items on programming competence and creativity. The questionnaire was

“We were interested in approaches that fostered children’s creativity using programming and how they could be designed to empower children to express themselves.”

designed in such a way that the younger students, who cannot yet read (well), were each read or read aloud an item and ticked the appropriate smiley on a smiley scale. The questionnaire and the observation protocols were supplemented by photos of the painted tiles as well as the laid route. These could then be evaluated in terms of the creativity of the story following the TTCT (Torrance Test of Creative Thinking according to Torrance, 1966) and other interesting questions arose, such as *How many obstacles did the children put in? Did the children lay the field with 20 (4x5) tiles, or*

did they only design the direct path? On the poster we presented this project idea in more detail. On this basis, we started a conversation about the project idea as well as the accompanying research. We asked, Are there further possibilities for creative development? Can creativity be addressed even more specifically? What influencing factors can play a role? We added a QR code to the app from the Bee-Bot to explain to the audience how and according to which principle the programming computer worked.

At the conference there were various innovative presentation formats but also classic formats. We liked this mixture very much, because on the one hand there were very scientifically oriented contributions and on the other hand there were also contributions from artists, or creative people from other areas, who presented their projects in a very interactive and innovative way.

Our poster presentation at the Share Fair on the Gather platform was a great experience. Here it was possible to enter, virtually, into conversations with participants from all over the world similar to an in-person conference. Even more, to us it felt like

we got a better overview of the different posters and also presentations. We particularly liked the possibility that the presenters of ten-minute talks also had the opportunity to present their work again in Gather. This provided additional space for exchange and connections, especially if you didn't have the opportunity to see the presentation beforehand or to discuss ideas afterwards.

It was a great opportunity to present and discuss our project. Having many different people sharing their expertise, perspectives, and approaches was very helpful. Above all, the creativity of the community has led to new possibilities. We made connections that make follow-up projects possible and also many ideas for optimizing the presented project. In addition, the sharing of ideas has also broadened personal horizons and inspired new creative ideas and projects.

“We made connections that make follow-up projects possible and also many ideas for optimizing the presented project.”

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SciArt Collaborations: Joys, Challenges, and Lessons Learned

Patricia Raun, Nina Stark, Carolyn J. Kroehler, Virginia Tech

Jacob Barney, C. Meranda Flachs-Surmanek, Carolyn J. Kroehler, Patricia Raun, Nina Stark, Daniel Bird Tobin



SciArt Collaboration are projects where researchers and artists work and play together to create artistic pieces about scientific research. The session included participation in some of the exercises we developed to catalyze these creative projects. The project began in May of 2021

when thirteen artists and thirteen scientists spent a day together at Virginia Tech in a “collaboration incubator” workshop. Partners and teams who found synergies submitted proposals for creative projects that could communicate the scientist’s work, and eight projects were funded by Virginia Tech’s Center for Communicating Science.

Funded projects included an aerial artist’s climate change adaptation performance in coastal North Carolina, a series of dance workshops aimed at helping engineering graduate students learn to navigate some of the discomforts of field research, a musical composition, poetry, video, and opera performance related to research on children’s perceptions of gender and science, digital video projections on

“Projects included ... a series of dance workshops aimed at helping engineering graduate students learn to navigate some of the discomforts of field research”

invasive plant species on the Virginia Tech campus, and more. Session presenters included some of the projects’ artists, scientists, and workshop facilitators, who briefly

described the eight collaborative projects. They shared the joys, challenges, and key “lessons learned,” engaging session participants in sample collaboration exercises.

Our session included a fifteen-minute presentation about the collaboration incubator workshop, the eight collaborative projects that emerged, and lessons learned. We appreciated opportunities to practice, experiment, reflect, participate, and get to know conference attendees in other sessions.

Biology through Art: Bringing Artistic Expression into Biology Courses

Michael R. Maxwell, Ph.D.
National University, San Diego, CA



"Biology through Art" is a network of biology instructors and artists that explores the integration of artwork into biology courses. The approach is a response to calls from national advisory bodies for the integration of education in biology and the sciences with the arts and humanities, as well as emphasis on the college graduate as a scientifically literate member of society.

I presented unifying themes in both art and science (observation, expression, communication), as well as themes in biology, such as symmetry, proportion, and color. I additionally presented artistic media that have been employed in recent biology

“Active engagement in artwork optimizes in-class instruction time, which is particularly important for non-traditional students, who often juggle the competing demands of coursework, jobs, and family responsibilities.”

courses at National University, California State University Fullerton, and Eastern Illinois University, along with pilot data on student pre/post short-answer responses. The teaching approach embraced by "Biology through Art" has shown several benefits to student learning. Active engagement in artwork optimizes in-class instruction time, which is particularly important for non-traditional students, who often juggle the competing demands of coursework, jobs, and family responsibilities. Pilot data of pre/post student responses have indicated that expression through artwork increases student comprehension of concepts in biology. Furthermore, project activities, such as exhibitions of student artwork at museums, offer opportunities for both student professional development and community outreach and engagement.

This was my first attendance and presentation at Cultivating Ensembles, and I had a lot of fun. I enjoyed the workshop's open, welcoming atmosphere. Most memorable was sharing ideas on bringing artwork into biology courses, as the participants were receptive and responsive to alternative ways of teaching.



Can We Improvise High-Quality Learning Environments?

*Jaime E. Martinez, Ph.D.
New York Institute of Technology*

Attempts at bringing performance, play, and improvisation into formal learning environments are subject to criticism. Concerns about time on task, lowering standards, and relevance are often cited. In this interactive workshop, attendees played, performed, and shared ideas about creating high-quality learning environments in institutional settings. Dr. Martinez has twenty years of experience improvising in

learning environments. I have worked with elementary school students, graduate teacher education candidates, in-service public school teachers, undergraduate students, and higher education faculty.

I have been presenting my work at Cultivating Ensembles conferences since 2012. My experience is that CE is the most supportive, challenging, and fun conference I've ever attended. In 2019 I didn't present my work; I hosted the conference location chair at the New York Institute of Technology in New York City.

This past year, I approached the CE conference differently than in prior years. I was now a conference co-chair, producing a virtual conference instead of the familiar face-to-face experience we were all accustomed to. I hadn't intended to present a workshop because I had been so busy organizing the conference, and nearly three years of being in lockdown had severely impacted my research agenda, which had been dependent on face-to-face interactions in educational settings. I felt like I didn't have anything new to offer. We received a late notification of cancellation in the schedule, one of the first 45-minute workshops on the first day.

"It's not often that undergraduates attend conference workshops with professors as peers. In my experience, CE creates new learning possibilities for attendees and presenters."

I then decided to offer a workshop that looked more or less like the online virtual zoom sessions I'd been offering my undergrads for the last three years. Some of my students shared that most of their professors struggled to engage in the Zoom environment and that my online classes differed.

The workshop went well. It was performed and improvised. I created the workshop with a diverse group of researchers, educators, and undergraduate students from Lloyd International Honors College at the University of North Carolina at Greensboro. It's not often that undergraduates attend conference workshops with professors as peers. In my experience, CE creates new learning possibilities for attendees and presenters.

I couldn't be more pleased and proud of our ensemble's work cultivating new virtual teaching and learning practices that felt supportive, challenging, and fun.



Making Change Happen at the Ronin Institute

*Alexander K. Lancaster, Ph.D.
Ronin Institute and University of Sydney*

The context for scholarship has changed. The cultural norms and incentives for scholarship today (e.g., 'publish or perish') were established during a now-outdated context for traditional academia (see Lancaster et al 2018). Such framing and assumptions no longer work in today's mainstream academia, let alone among the growing numbers of scholars and researchers that operate outside traditional academic institutions under different incentives, motivations, and business models.

The Ronin Institute has been working and developing new approaches to performing scholarship for the last ten years to foster this much needed cultural change in scholarship. This has taken several forms: building our community of Research Scholars, as well as hosting Unconferences to work together to change the research culture as a whole. In 2021, the Ronin Institute and the Institute for Globally Distributed Open Research and Education co-hosted the Scholarship Values Summit to provide a space for participants to identify harmful scholarship-related systems that no longer work, and to define shared values in scholarship as a basis for creating new healthier systems that are more supportive of our goals as scholars and of society. After the Summit, participants created a series of three blog posts synthesizing the sessions and proposing next steps.

In this Cultivating Ensembles short presentation, we described how we have been balancing the building of our community of Research Scholars, with the necessary building of the governance and infrastructure. Through iterative experimentation within our community, we have been attempting to balance both individual and collective goals of our Research Scholar. This includes experimenting with everything from how we organize and run our Working Groups, to community-based development of our

Code of Conduct, and how we organize meetings such as our Scholarship Values Summit 2021 Unconference.

The COVID-era Cultivating Ensembles virtual experience was certainly different from the experiences of the in-person meetings I attended in 2017 and 2019! But I think it was actually one of the most successful virtual conferences I have attended. Including more time for games and prompts at the beginning of sessions really helped the sense of cohesion and interactivity. The moments of informality before the “real” prepared material starts, are at least as important as the advance preparation as they allowed presenters to breathe together, even if on Zoom. I particularly enjoyed the group drawing experience. I always leave Cultivating Ensembles conferences with an enlarged set of possibilities for the sheer variety of work and play that can link together STEM and arts. This year it was particularly around people working on the lived experience of researchers with different backgrounds.

“I always leave Cultivating Ensembles conferences with an enlarged set of possibilities for the sheer variety of work and play that can link together STEM and arts.”



Conference participants Raquell Holmes, Omar Ali, and Linda Dunston-Stacey

Collaborating Through Time and Space

Laura Peticolas, Ph.D. and Aurore Simonnet
Sonoma State University

As a space physicist and an artist, we took participants through our personal journeys through time and space. Our collaborations with artists and scientists have resulted in multiple projects, including the sonification of space physics data, a tiny book on atoms, games, paper models, and artwork on the cover of *Nature* magazine. We have worked with performance artists, astrophysicists, Indigenous researchers, Neurodiverse teens, teachers, and one another. Additionally, our work has resulted in multiple educational websites about earth and space science, combining art and science. We invited participants to join us in our space-time journey via an online facilitated engagement with these projects. Participants provided interactive feedback on what we might endeavor to do next in the collaborative space.

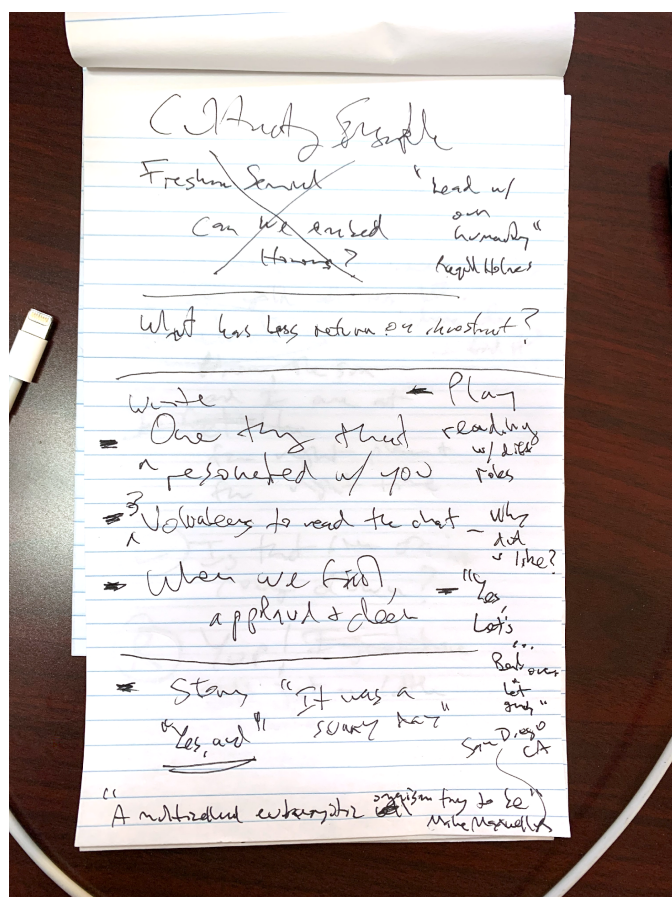


Creating an inclusive, interactive space at CE 2022 was an energizing challenge. The challenge was to create a ten-minute virtual narrative about our collaborations, while sharing the products we developed. The approach we took was to present one collaboration per year over a decade. To gather participants' feedback during the presentation, participants commented on an interactive online board, a Jamboard. The question for participants posting on the Jamboard were: "What do Laura and Aurore do that connects to what you do?" and "What collaborations inspire you?" Answers to these questions included the following: "Fermi stained glass!," "Engaging and inspiring people using the wonder of the physics of the Universe," "Want to learn about

integrating indigenous ways of knowing in university physics courses,” and “Scientific discovery and data as inspiration for art.”

The multiple modalities of learning throughout the workshop, even as a virtual workshop, reminded me of how effective it is to engage participants in activities that push them/us out of our boxes. Moving, listening, watching, and telling stories were used to connect and teach. The spontaneity and opportunities to meet people outside of my discipline was refreshing.

“The spontaneity and opportunities to meet people outside of my discipline was refreshing.”



The interactions in our sessions as well as in the Gather presentation stations, i.e., virtual posters, created additional quality time for discussions and questions. By the end of the workshop, two strangers had started a spark, which has continued with emails and meetings. We are brainstorming ways we can collaborate, and we are excited to see what comes from this connection.

Notes taken by Omar Ali during the conference. At the top right, he quotes Raquell Holmes: “Lead with our humanity”; and in the middle, a group facilitating gem to practice—ask participants to write down “One thing that resonated” and then build a conversation around this.

Biotheatrics: A Collaborative Journey of Biology and Theatre Students



*Carol Goodwillie, Ph.D., Gabe Duggan, M.A., and Patch Clark, M.F.A.
East Carolina University*

This was our first time presenting at a Cultivating Ensemble conference. The conference presentations, participants, and ideas were all inspiring and helped to reinforce the power of shared discovery through the collaborative efforts of arts, humanities and science. We worked together to decide what and how we would present, which was an exciting process in and of itself. It brought back memories of our collaborative work together in the classroom in which our students shared their knowledge, experiences, and talent. Collaborative journeys and discovery were two very positive outcomes of our working together in the classroom with our students in this newly “blended” group of learners. The end result was a newfound respect for each of the disciplines, a play for young audiences, *Molly and Her Tree Life Adventures*, and a number of engaging follow-up activities for teachers, students, and parents. The play was performed several times both

virtually and face-to-face and one presentation even involved audience participation. Each class and performance was exciting. Each class and performance brought joy.

We related this learning energy and excitement to conference participants virtually, using visuals and participation in the process. We also included a scene from the play and asked the participants to serve as actors. The end result was yet another experience of the positive power of collaborative work as the actor-participants embraced each of the characters with so much enthusiasm and energy we felt we could have produced the entire play for an audience on the spot!

The enthusiasm of our participants in the workshop was much like the dedication and commitment of our students who worked so hard together to present an understanding of science through the performance arts. We also asked participants to generate their own ideas for a theatre collaboration, and the amazing products created in just a few minutes were a testament both to the nurturing and inspiring environment of the Cultivating Ensembles conference and to the power of theatre to bring people and ideas together.

The discussion which followed was equally exciting as we shared the experience of collaboration as a group which, in turn, generated many ideas for future collaboration and creating new ensembles of learners, educators, artists, scientists, and practitioners. Throughout the two days, which were packed with new ideas and experiences, we danced, sang, cried, made connections, and were inspired. CE is an amazing conference that not only shares past and current work, but generates exciting ideas, projects, and collaboration for the future!

“Throughout the two days, which were packed with new ideas and experiences, we danced, sang, cried, made connections, and were inspired.”

Game Theory and Play in a Digital Writing Center

*Hannah Ward, Lloyd International Honors College,
The University of North Carolina at Greensboro*



My presentation was on the ways in which the components of Digital Game Theory can inform the development of strategies for learning and peer-tutoring within digital spaces. Online formats of learning create a space for play and, much like a videogame, contain creative patterns of engagement that impact the effectiveness of online learning as a whole. Principles and interactions typically found in an online writing center function much like videogames: The interactions between people and the digital environment affect the outcomes. Moreover, there are practical applications for this framework in online writing center environments.

The audience was asked how the pandemic and digital learning impacted their personal teaching or learning strategies. Audience members were encouraged to think critically about their own experiences in order for them to successfully understand how the framework of Digital Game Theory applies to all types of online learning. Additionally, I asked about participants' experiences with play in learning environments.

By the end of the session, participants were hopefully able to understand the components of Digital Game Theory, how these components apply to online peer-tutoring and peer-consulting activities, and how to implement strategies related to game theory in their own teaching, tutoring, and learning.

It was at the urging of my Honors College Dean that I applied to present at the Cultivating Ensembles conference. I was not aware of Cultivating Ensembles nor the impact it has on academic and community engagement, but I was looking for new ways to get my research into the world. I decided to make a submission and was thrilled when my work was accepted! I began working immediately on crafting my presentation and hoped I would get the opportunity to engage with other researchers.

What I had not realized was that this conference would give me the opportunity to present alongside and learn from professionals. I had only presented at undergraduate student conferences before this and expected that any platform willing to hear from me would include mostly undergraduate students. I was wrong. Not only did this conference allow me to practice presenting, but I had the opportunity to interact with scholars within my field of study who were actually

“Not only did this conference allow me to practice presenting, but I had the opportunity to interact with scholars within my field of study who were actually interested in what I had to say... I loved how participants in the conference created an environment where a diverse group of individuals were able to come together to hear about and learn from each other.”

interested in what I had to say. After my presentation, I was able to make some connections with others about my work. I very much respected the creative and academic processes I went through to create my project and I loved how participants in the conference created an environment where a diverse group of individuals were able to come together to hear about and learn from each other. I listened to so many wonderful perspectives on research that helped me adjust my own approaches to learning as well.

Even though the conference was entirely virtual, I felt like I got the most out of the experience and the space created for individuals to learn from each other.

Mindfulness of Physics (and Physics of Mindfulness)

*Mackenzie Hawkins, Wuwei Tai Chi School and
Carolyn Sealfon, Ph.D., Ronin Institute*



We use physics in space programs because it gives us the correct information to send probes on interplanetary voyages. Yet how much do we think about using physics to give us better mindful awareness of our own movement?

During this workshop, we used lots of exploratory activities to investigate how mindfulness of physics can help us move with a greater sense of ease and flow and how simple, rational explanations can help us open to the presence and calm of improved mind-body connection. So much of our mental and emotional stress is fueled by regrets about the past and worries about the future. Yet physical initial conditions (position and velocity at the present time) encompass all past, present, and future information. In a final exercise paired with a lively discussion, we explored these ideas through experiential exercises introducing the concept of nowflow. We had a wonderful experience of creating an inclusive, interactive space at CE. It was very ensemble-y! It didn't matter that we were virtual, the connection felt real. Everyone was curious and leaned into learning more. Participants were very willing to engage in tai chi motions as a whole group and in discussions in breakout rooms. There was a sense of shared exploration and co-creative curiosity. As our session integrated both mindfulness and physics, participants expressed feelings of inclusion as both scientists and as

non-scientists. One comment that we appreciated was from a participant who did not identify as a scientist, but said she was now interested in learning more about physics.

People are far more willing to engage and play at CE compared to other conferences. It wasn't strange to have more doing than talking—at CE that is normal! The participants dove right in and gave us a lot to build with in our workshop. In terms of preparing for this session, we greatly enjoyed co-creating the workshop together. As it was our first time offering such a workshop together, we were impressed that each part and activity really worked as well as we had hoped! How the physicists and the biologists in the room took what we were sharing and interpreted it using their own different lenses was incredibly inspiring. What was also fascinating was how people with experience in mindfulness and movement had “ah-ha” moments and how people without that experience felt a bridge into those practices based on exploration and basic physics.

In terms of impact, we felt really energized by the discussion and interest. We hope to do more collaborations and bring versions of our CE workshop to other conferences. In general, CE is the most participant-centered conference we know—that is more about sharing co-creative experience than about disseminating knowledge. In a world where it can seem as though many people want pat answers and quick check-the-box solutions, it was refreshing to connect with so many people who want to dig in, go deep, and think out-of-the-box!

“It was very ensemble-y! It didn't matter that we were virtual, the connection felt real... it was refreshing to connect with so many people who want to dig in, go deep, and think out-of-the-box!”

Reflections from the Program Co-Chairs

*Nick Gross, Ph.D., Boston University and
Carolyn Sealfon, Ph.D., Ronin Institute*



Cultivating Ensembles attracts creative and accomplished individuals who share a cross-disciplinary and playful spirit. They come to CE to share their love of playing at the intersection of art, STEM, and education. The aim and joy of the Program Committee is to cultivate ensembles within Cultivating Ensembles. This year, our challenge was to do so online.

To set the tone, we programmed welcoming sessions involving co-creative play. Naturally, we need to shift newcomers' expectations away from a passive and possibly judgmental academic conference experience towards a dynamic, inclusive experience provoking curiosity and discovery. We started each day with collaboratively drawing on a virtual whiteboard (see page 14). This activity engaged everyone in the spirit of creative ensemble and helped newcomers feel welcome.

In our abstract submission process, we asked authors to explain how their session would be interactive, to indicate what percentage would actively engage participants, and to articulate active learning goals. Through the review process, volunteer reviewers offered feedback, focusing on the likely levels of participant engagement in each session. This helped support all authors, including those new to CE, to think about and implement high-quality interactive sessions.

Exciting parallel sessions of workshop and ten-minute talks (held on Zoom) led us to consider COMO or the "Certainty of Missing Out" (in contrast with FOMO or "Fear of Missing Out"). To embrace COMO, we included short periods after parallel

session for “share outs” where participants (not the presenters) from each session playfully summarized what they learned or created during the session.

Finally for the conference “Share Fair” (conceived of as a “Poster Session Plus”), we created a space (<https://app.gather.town/app/h09htNOh94dwQ0oe/CE2022>) on the Gather platform to playfully foster discussions in small groups. Share Fair “booths” in Gather featured videos, websites, slides, posters, and interactive bulletin boards. The Program Committee was delighted at the final conference results and are very proud of what was created by the collection of individuals attracted to CE!

NG & CS

Acknowledgments

Many thanks to the following partners in the making of the 2022 Cultivating Ensembles conference: Nick Gross and Carolyn Sealfon, CE Program Committee Co-Chairs, and members of the committee, including Sofya Borinskya, Marisa Holzapfel, Sarah Hug, Simone Hyater-Adams, Alex Lancaster, Jamé McCray, Maria Qadri, and Sedona Young, as well as members of the Lloyd International Honors College Ensemble, including Linda Dunston-Stacey, Rebecca Muich, Angela Bolte, Christopher Kirkman, Eric Toler, Natalie Fagundez, Jeremiah Ravenel, and Jasmin Doctor.

*As always, we are indebted to our Founder, Raquell Holmes, who has led and inspired our small, but mighty ensemble for over ten years! And we are grateful to this year's co-sponsors, including improv**science**, Lloyd International Honors College, The University of North Carolina at Greensboro, and RideFlyView.*

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