



STEM-ester in Review

Kaput Center Newsletter

Welcome

Fall 2018 has flown by and we have been busy doing STEM and planning some exciting new adventures. This newsletter will get you updated on some of the most exciting things we've been doing, with many more to come in Spring 2019. You can always email us at kaputcenter@umassd.edu or check us out on the website <http://kaputcenter.org>. We also have Facebook and Twitter accounts: <http://facebook.com/kaputcenter> and <https://twitter.com/kaputcenter>

Please like us and share frequently and widely.

New People

The Kaput Center is delighted to welcome Ram Bala and Beth Cullen to our Executive Board. We look forward to our work together!



UMass Dartmouth begins STEM Education Ph.D. Program

By: Stephen Witzig, Associate Professor - Science Education

In summer of 2018, the Massachusetts Board of Higher Education gave the final approval necessary to UMass Dartmouth's Department of STEM Education and Teacher Development to begin to offer a PhD in STEM Education. This significantly expanded the existing PhD program in Mathematics Education by adding concentration areas in Science Education in addition to Mathematics Education with the ability to add Engineering Education in the near future. The expanded program attracted the attention of potential students, as there was a spike in applications. The result was a 2018/2019 cohort of nine new doctoral students in the program – the largest cohort since the 2012/2013 academic year.

The new doctoral students interest in STEM Education

add to the research interests of the existing students and align well with the faculty research conducted at the Kaput Center for Research and Innovation in STEM Education. The Kaput Center serves as an incubator for ideas, a meeting space for students and faculty, and a research facility that fosters cutting-edge research in STEM Education. The synergy between the Kaput Center and the STEM Education PhD program was intentional. This synergy benefits the students, the faculty, as well as the local, national, and international STEM Education community at large.

The STEM Education PhD program is designed to develop scholars who are experts in current, innovative research practices and who have been well-prepared for diverse careers in higher education, research institutions, or industrial settings that are focused on improving educational attainment in mathematics, science, or other STEM-related subjects. A tight integration of curriculum and research provides critical authentic learning experiences through coursework, seminars, and internships both at UMass Dartmouth and at other academic institutions and non-academic partners. In this way, the program addresses key contemporary educational challenges, offering future STEM educators advanced training and experience. For more information about the program, including how to apply, see: <https://www.umassd.edu/programs/stem-education-phd/> and feel free to reach out to any of the faculty to answer questions you may have.

STEM Summit

By: Shakhnoza Kayumova, Assistant Professor - Science Education

The Kaput Center for Research and Innovation in STEM Education's Director Dr. Chandra Orrill and research scientists Drs. Stephen Witzig and Shakhnoza Kayumova presented at the Massachusetts STEM Summit 2018 and shared their experience in organizing and running the annual STEM4Girls event hosted by the Kaput Center. The session was very well attended with an audience close to 150 people included

organizations, schools, teachers, and educational leaders interested creating STEM outreach opportunities for diverse learners, and particularly girls. Dr. Orrill and colleagues shared with the audience their insights and experiences running STEM4Girls outreach program, including information about recruitment, ensuring diversity of participants, building partnerships with faculty in other colleges and teachers in schools, and planning the event to capitalize on the resources of the university. Dr. Orrill presented findings from the survey of participants and volunteers about what worked and what didn't work as well as changes that will take place during the event for 2019. Drs. Witzig and Kayumova shared their experiences and the curriculum they have developed for science workshops for the girls. The members of the audience shared their own experiences and questions about how to develop engaging STEM activities, so that, as a community, we can learn from each other.



Dr. Janet Kolodner's Visit to the Kaput Center

By: James Burke, Post-Doctoral Fellow

In 2018, exciting developments at the Kaput Center had us looking to the future of extending and deepening what learners know and can do in science and mathematics. With the approval of the new STEM Ed PhD program, one way we celebrated last fall was to welcome Dr. Janet Kolodner to speak on her efforts to inspire awe in STEM students. Dr. Kolodner is a pioneer in understanding how people learn from experience through her work on case-based reasoning. As she describes it, this approach tells us that “the better we can extract out connections between things in an experience, the better we’ll be able to re-use what we learn.” Applying this idea to problem-based learning, Dr. Kolodner and her colleagues found how sequences of classroom activities could allow middle school science students to succeed in challenging construction tasks while engaging in “science talk” to both justify and explain their work. Their findings emphasized the importance of a classroom ethos in which learning is a shared responsibility among all the participants – an understanding that influences mentoring in the Kaput Center CoderDojo today.



During her presentation to an eager audience of students, faculty, teachers, and community-members, Dr. Kolodner presented some of her work and thoughts on what middle school students learned in a multi-user virtual environment. The EcoMUVE project sought to determine what in the technology and classroom environment influenced students’ learning while they engaged in scientific inquiry. Dr. Kolodner related a reaction she had to her work that, I wager, is familiar to many educational researchers. While she and her colleagues were addressing their research questions about what students remembered (their so-called “cold cognition” discoveries) there were even more interesting “hot cognition” discoveries to be made in the experiences that drew students in and made them “jump up and down” in excitement. EcoMUVE’s support for the autonomy of students in exploration and purposeful inquiry proved to be an influential aspect in how students engaged in activities. The virtual environment’s readily available tools and resources supported conjecturing, discovery, and then justifying discoveries to peers. Those affordances placed students in an empowered and exhilarating position of responsibility.

Dr. Kolodner’s observations are a valuable and welcome reminder that our shared educational endeavor is also one of passion. As educators helping our students know and do more than ever before and as researchers working diligently to answer our most significant questions, there is something important in our students’ joy. This is especially true when that joy stems from the authenticity of the experiences we offer, the autonomy that our students are afforded, and the wonder and awe students should feel when they accomplish goals of well-designed classroom activities.

CoderDojo Launched at the Kaput Center

By: Kimberly Welty, Grant Support Specialist

The Kaput Center launched its own CoderDojo on November 3rd, 2018. We had a full house (and a waiting list!) with 29 Ninjas (kids 7-17) attending sessions ranging from Scratch to Python and HTML. Chandra Orrill, Director of the Center, said the following when asked why she was inspired to create a Dojo “Each year, at our very successful STEM4Girls event, parents would ask me what else was available for their girls to do all year, and what opportunities existed for their boys? This club is our cost effective answer to both of those questions.”

Scratch, an easy to use, block-based programming language, allows users to program interactive media such as stories, games, and animation. Scratch is designed and maintained by the Lifelong Kindergarten group at the MIT Media Lab.

Python, one of the most popular and widely used open source programming languages, has an easy to read and write syntax which is used to create web development tools, games, scientific and networking programming. Ninjas are exposed to Python coding by using Pi-topCEEDs (Raspberry Pis), and Chromebooks.

The main aim of these sessions is to provide students an opportunity to engage with coding to create their own projects. The Center is planning to host a Dojo every first Saturday of the month, from 10am to noon on the UMass Dartmouth campus.

CoderDojo, an international organization based in Ireland, is made up of 58,000 Ninjas who are being creative with technology with the help of 12,000 volunteers in 109 countries.

Special Thanks to our Volunteer Mentors:

Dilshad Achilov, James Burke, Melissa Cieto, Meghan Denny, Tobey Eugenio, Paul Fredette, Tatyana Frost, Hamza Malik, Temple Mitchell, Chandra Orrill & Kym Welty



Grant Spotlight: Making Proportions Fun

By: Chandra Orrill

As part of my NSF-funded Proportions Playground project, James Burke (Postdoctoral Fellow) and I travelled to deliver professional development to 22 teachers in December 2018 and Kym Welty joined us in a second offering for 15 more teachers in January 2019. The three-day professional development was focused on three big ideas: quantities, covariation, and constant relationships. The goal was to engage teachers in reasoning about proportional relationships. We built the curriculum for Proportions Playground around a set of values: playfulness, engagement, and exploration. To meet these values, we provided teachers with dynamic “toys” that let them make conjectures about the mathematics, then try those out. We saw in my previous project that engaging teachers in these computer-based environments really allowed them to try out ideas rather than rushing to find the answer. We built from work James had done in his dissertation about playfulness to try to create an environment in which the teachers felt safe to ask questions and explore mathematical ideas they might have been nervous about. To do this, we set some ground rules declaring our PD a judgement-free zone. We also wrote the tasks to really engage participants in discussion. We posed “mysteries” and “challenges” rather than giving them “math tasks” and we celebrated and explored disagreements. The teachers were thrilled with their experience giving use very high marks on their exit survey and stopped to thank us (and even hug us!) on their way out the door. We will use the data we collected to consider (a) how teachers interact with the Proportions Playground toys to reason



about proportions; (b) what evidence there is of participants making connections in their own understandings’ and (c) what evidence there is that Proportions Playground supports teachers in reasoning about proportional situations. The Proportions Playground toys are on the Kaput Center website: <http://kaputcenter.org/proportions-playground> please feel free to email me if you’re interested in learning more (corrill@umassd.edu).

Upcoming Events

The Kaput Center is hosting an ISTE Teacher Certification course offered by Eduscape. The face-to-face portion of the course will be offered at the Kaput Center on March 14-15. The rest will be offered online. Get more info: bit.ly/fairhaveniste