It is hard to believe that only two years have elapsed since we introduced UTeach to UMass Lowell. We began small, and have been growing slowly. In the past year alone, we have increased our student intake into STEP 1 and brought in a new master teacher, Dr. Eliza Bobek. Whereas two years ago we were emerging as a new program, struggling for recognition, UTeach UMass Lowell is now well-known throughout the campus, and beginning to receive prominence in the wider community.

We are grateful to the College of Sciences, Francis College of Engineering, and the Graduate School of Education for the support we have received from their staff and faculty. We are also grateful to our partner schools, the Superintendents, the Principals, and last but not least our team of wonderful mentor teachers, without whom we would not be able to function. Finally we are grateful to our sponsors and donors: Cabot Cooperation, United Technologies, Greater Lowell Community Foundation, M2D2, UTeach Institute, and Verizon Foundation for providing us with funds, student internships and the technology. Last year was indeed a productive year for UTeach, and I hope that we can follow this through in 2014 as we continue to prepare the next generation of teachers to teach our leaders of tomorrow!

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*Dr. Sumudu Lewis, Program Director, UTeach UMass Lowell, Sumudu_Lewis@uml.edu*
Power to Production in STEP 1

**Tsongas Industrial History Center (TIHC)** is a partnership between the University of Massachusetts Lowell Graduate School of Education and Lowell National Historical Park. TIHC offers a variety of activities for field trips as well as workshops for teachers. One of the activities offered at the TIHC is Power to Production. Although this is an activity designed for Grades 4 to 12 students, it is also very popular with teachers. This activity incorporates history with science where one needs to think and work as scientists and engineers to test solutions to effectively harness water power.

In the fall semester, we took UTeach STEP 1 interns on a field trip to explore and experience this activity themselves. They tested water wheels by collecting data on their speeds and determined which wheel works the best ...

... and they designed and built a mill-and-canal system and explored how water's potential energy can be transferred to kinetic energy that would ultimately power the machines at a mill.

The UTeach STEP 1 interns, already thinking like scientists and engineers, solved the problems with ease. That is of course after a few soaking moments!

We are grateful to the staff at the TIHC ([http://www.nps.gov/lowe/parknews/tsongas-industrial-history-center.htm](http://www.nps.gov/lowe/parknews/tsongas-industrial-history-center.htm)), especially Ranger William Morton for a personalized guided tour of the mills.
Quarks to Galaxies: UTeach Interns Scale up!

UTeach STEP 2 interns led the way in Spring 2013 to develop and deliver curriculum modules about physical scale to 8th Grade students titled ‘Quarks to Galaxies’. This Lowell Public Schools Outreach Initiative was a result of a grant received by Professor David Kazmer, UTeach Co-PI and Engineering professor. The goal of this initiative was to assist Lowell Public School students to increase their STEM awareness, consider STEM careers and plan STEM coursework. The concept of ‘scale’ was used to develop the 8th Grade students’ awareness of the micro to macroscopic concepts scientists and engineers deal with on a daily basis.

UTeach STEP 2 interns, led by UTeach master teacher Mrs. Irene Martin, played a crucial role in this outreach initiative. Although the task of developing a lesson on scale was a challenging one, the STEP 2 interns were amazing at meeting this challenge, and created some very exciting lessons.

George Katsoras, a mathematics major, provided students with Google maps, on two different scales with two different routes, of his journey from the university to the school where he was teaching. He then challenged the students to find how many steps it would take him to walk to the university from the school, if one of his steps were 20 inches! The students really enjoyed this lesson and realized that the distance did not change, just the scale.

Eduardo Beato, also a mathematics major, asked students to estimate how many Starburst candies would fit into a large jar. He was impressed when one student had set up an algebraic formula in her head to carry out the estimation.

Michael Forsyth, a computer engineering major, challenged his students to handle the task of scaling down. He asked students to scale down the Eiffel Tower to an appropriate size that would fit on their desk.

Laura Sargent, a biology major, had her students working at the microscopic scale. They estimated the approximate size of cells, and then estimated the number of cells making up an organ like the heart, and then a whole organism. She found that once students were able to make the connection between the size of a cell and the organism, they were able to see the extremely large scale between one cell and then trillions of cells.

‘Quarks and Galaxies’ certainly took the UTeach interns and the 8th Grade students on a magnificent journey exploring scale, which Mrs. Martin described as “a valuable experience”, which the UTeach interns, the 8th Grade students and their teachers will never forget. Not only would this outreach initiative have increased the 8th Grade students’ STEM awareness, but the fact that they were taught by knowledgeable, enthusiastic STEM majors, probably provided the youngsters with role models to aspire to as they themselves move onto the next stage of their education.
Central to the UTeach curriculum is the incorporation and use of emerging instructional technologies. UTeach UMass Lowell strives to maintain this philosophy by providing the UTeach interns at UMass Lowell with many opportunities where they use technology. So this year we were all thrilled when Verizon Foundation picked us to work with UTeach Austin and three other UTeach sites to infuse mobile technology i.e., Samsung Android tablets, into teaching. For participating in this exciting venture, we received a mini grant of $66,500 from the UTeach Institute at the University of Austin Texas, and 35 Android tablets with all-inclusive 4G, from Verizon Foundation to plan explorations using these Android tablets in STEP 2.

STEP 2 interns were indeed thrilled by the opportunity to use these tablets to plan lessons, and the middle school students were more than thrilled when the interns took these tablets to the schools!

The UTeach interns created some amazing lessons ...

Clint Perry, electrical engineering major, planned a lesson on constellations using the Sky Maps App. Students were asked to use this App to identify constellations seen in the night sky...

Although it was fascinating to observe Clint enjoying himself exploring the constellations and planning the lesson, observing the enthusiasm displayed by the 8th Graders at the Bartlet Community Partnership School in Lowell, was priceless!!

Clint thoroughly enjoyed the lesson and was impressed that the students were able to find their way around the constellations and use the names of the constellations to locate where they were in the night sky.
Marly Thomas, a biology major, used the Life Simulator App to plan a lesson where students explore the evolution of a species in “real” time. This simulation allows students to provide a species with an advantage over the other, which would enable that species to survive harsh conditions. Students then monitor the fate of each species learning about competition, adaptation, and evolution.

Marly’s students and her mentor teacher at Daley Middle School in Lowell absolutely enjoyed the exploration. The students were engaged and focused on observing the fate of the two species of plants as they changed various environmental conditions and watched one species become completely extinct!

Infusing mobile technology into the classroom was embraced enthusiastically by the UTeach interns. They had heaps of fun exploring what these tablets can do ...

...and the middle school students had fun exploring the science or math concept that was carefully and meticulously planned into a lesson by our UTeach interns!
The UTeach interns at UMass Lowell often rise to the occasion in all UTeach courses and plan fantastic lessons using their creativity compounded with their passion for their major. However, the most amazing lessons were demonstrated by the interns who progressed up the UTeach courses into Project-Based Instruction (PBI). This course expects interns to infuse technology, integrate math and science, and design a unit of intellectually challenging, and connected lessons immersed in intensive field-based experiences. This PBI course was led by Professor David Kazmer and Dr. Michelle Scribner-Maclean. They took the UTeach interns on a journey of self-discovery and allowed them to see what they are capable of achieving as future teachers!

Working with students at the Greater Lowell Technical High School and the teachers, Libby Often (mathematics) and Tara Goodhue Alcorn (biology), the UTeach interns developed and delivered a project-based module aligned with their class’ curricula. The projects were delivered to the high school students as the field experience at the Tsongas Industrial History Center. The PBI course was an immense success, both Professor Kazmer and Dr. Scribner-Maclean were utterly impressed with the interns’ projects and commented on many occasions that the UTeach interns really beat their expectations.

Eduardo Beato (mathematics) and Ashley Bretton (biology) were two of the interns who took this course. They prepared a unit plan for 9th grade students to answer the question “how can you minimize your negative affect on the ecosystem?” Having taught four lessons they took their students on a field trip to the UMass Lowell Boathouse. Here the youngsters tested the water from the Merrimack River, plotted their data using iSense software, and compared it to the data collected by their peers. Both Ashley and Eduardo were thrilled to see how their students were able to connect the fact that the project involved many different topics, and yet they were able to make the connection between these topics to answer the over-arching question.
Erinn McLaughlin (mathematics) and Matthew Desmond (mathematics) decided to develop a project involving water wheels. Their project involved grade 12 students investigating the answer to the question “what are the mathematics behind creating a water wheel that produces the most power?” Although their plan was to focus on mathematics, the students found themselves immersed in a project that also involved integrating physics and engineering. The first part involved students working with angles—figuring out what angles would work best for the water wheel. Once they had done the calculations, they had to design and build their water wheel. Erinn described this as a critical part of their project where students began to value the need to write down the steps of the procedure. Once the students had built the wheels, it was time to test them at the Tsongas Industrial History Center.

Nicholas Rossetti (mathematics) and Daniel Packard (mathematics) based their project on maximizing production and profit in a business by focusing on quality vs. quantity, and minimizing expenses. The major experiment the 12th Grade students did was at the Tsongas Industrial History Center where students worked under different conditions making stamped paper towels. They investigated whether the conditions of having more workers or fewer workers, and working fast or working slow created the largest number of towels that could be sold. The interns showed the students how to analyze data using iSense, and then on returning to school, students discussed the profit function as a sum and difference of two functions. The interns successfully showed through their project how the applications of functions related to the business world.
UTeach UMass Lowell in Austin Texas

In May 2013, UTeach Institute hosted the 7th annual UTeach Conference at the AT&T Executive Education and Conference Center on the campus of The University of Texas at Austin. The UTeach Conference, through series of workshops, seminars, and discussions offered professional development for the master teachers and faculty of the UTeach replication sites, and information for potential partners including state policymakers, donors and fundraisers. More than 500 participants, which included faculty, staff, and undergraduate students from UTeach replication sites across the country attended the 7th annual conference, Among these participants were faculty, staff, and students from UTeach UMass Lowell.

Irene Martin (Master Teacher), Dr. Anita Greenwood (Dean of Graduate School of Education and UTeach Co-PI), Dr. Scribner-Maclean (Faculty at the Graduate School of Education and PBI instructor), Dr. Sumudu Lewis (UTeach Director and Master Teacher), Robin Hall (Program Manager), Professor Ken Levasseur (Department Chair of Mathematics and Co-PI) Professor David Kazmer (Professor of Plastic Engineering and Co-PI), and the UTeach interns Ashley Bretton (biology) and Matthew Desmond (mathematics).

UTeach UMass Lowell was proudly represented at this 7th annual UTeach Conference by Dr. Greenwood, who participated on a discussion panel, Professor Kazmer, Professor Levasseur, and Dr. Lewis who led workshops or presentations. The UTeach interns also contributed by presenting their experience of starting and running a student organization.
Dr. Anita Greenwood participated on a panel discussing the role and responsibilities of a UTeach director. The panel consisted of directors, co-directors, and administrators from other UTeach sites representing a range of experiences and strategies for setting up UTeach. They addressed the proposal process, the issues which arise during the planning for UTeach, and the problems that must be solved once the program begins. The audience were faculty and administrators from universities who were thinking of applying for HHMI funding to start a UTeach program.

Professor David Kazmer presented on a topic which he has the greatest of expertise—UTeach Engineering! This was an interactive and an informative presentation where questions and ideas were discussed relating to the similarities and differences between UTeach science and math majors, and UTeach engineering majors. UTeach UMass Lowell is one of a handful of UTeach sites that is striving to cater for Engineering majors.

Professor Ken Levasseur presented in a workshop for master teachers and faculty involved in instructing on the UTeach course Functions and Modeling. This UTeach course is offered at UMass Lowell as a math elective. Professor Levasseur shared his experience of teaching this course and provided some useful strategies to other UTeach instructors who are planning on delivering this course at their site.

Dr. Sumudu Lewis presented her experience of teaching the UTeach course Perspectives on Mathematics and Science, which is offered as a Gen Ed. course at UMass Lowell. She shared her experience of the course and led the audience through a workshop titled ‘Aristotle to Galileo’.

The UTeach interns Ashley Bretton and Matthew Desmond presented to other college students and master teachers on how they established WeTeach and the activities they had offered as a UTeach program.

In addition to presenting, we all attended various other presentations and lectures and generally had a good time... (especially the students!)
Internships

UTeach UMass Lowell program recruits and trains talented science, technology, engineering, and math undergraduates to become teachers of tomorrow. As part of the training of these pre-service teachers UTeach UMass Lowell offers paid and unpaid internships. We work closely with various organizations and businesses and local schools to find appropriate internships for our UTeach pre-service teachers. The internships provide them with the skills that would enable them to develop and grow to become highly effective teachers.

M2D2—Massachusetts Medical Device Development Center provides opportunities for start-up medical device companies by offering affordable, and coordinated access to researchers and resources at the Lowell and Worcester campuses of the University of Massachusetts. Among these services and facilities offered by M2D2 include: business development assistance; engineering and design assistance; clinical pathway assistance; and incubator space and facilities.

In the fall semester 2013, M2D2 launched the “M2D2 Partnership Experience” - a partnership program with Lowell High School. This medical device development courses were created to encourage participating Lowell High School students to identify a medical device need, and innovate technical and business solutions. This project based activity integrates the disciplines of medicine, engineering, and business. In order to make this a successful venture, M2D2 offered two UTeach pre-service teachers paid internships to work for 4-5 hours a week with the Lowell High School students. Kreg Kaminiski (biology major) and John Romano (math major), landed this internship, which they described as a “dream come true.” Working collaboratively with Professor Stephen McCarthy (M2D2 Director,) and Steven Tello (Associate Vice Chancellor for Entrepreneurship & Economic Development), both Kreg and John has received valuable experience and skills in business and entrepreneurship, which no doubt will enable them to succeed in becoming fantastic teachers.

Lowell High School Honors students participating in M2D2 Partnership Experience with John Romano (left) and Kreg Kaminiski (right).
UTeach STARS— In Fall 2013, uTeach UMass Lowell formally launched the UTeach STARS program (Student Teaching Apprentices Reaching out to Schools). UTeach STARS is the brainchild of UTeach UMass Lowell’s newest master teacher Dr. Eliza Bobek.

Dr. Eliza Bobek began her teaching career as a New York City Teaching Fellow in Brooklyn. She has since taught science at the school for New Explorations in Science, Technology, and Math, The School at Columbia University, and most recently at The Packer Collegiate Institute, all in New York City. She has extensive experience designing curriculum at the middle school level and integrating technology into the classroom. She received a Spencer Research Training Grant to support her doctoral work, which explored the use of visual explanations to understand complex processes in science. She completed her Ph.D in Cognitive Studies in Education at the Teachers College, Columbia University. She has also worked for The New Teacher Project to train pre-service Special Education teachers in New York City. We are delighted to have her working at UTeach UMass Lowell; she is indeed a great asset to the team!

Why be a UTeach STAR? By volunteering time in a local school, UTeach interns, aka pre-service teachers, will gain additional valuable experience working with students in small groups, while schools benefit from the strong STEM background the UTeach pre-service teachers bring to the classroom. It is also a resume building experience highlighting the pre-service teachers’ links and service to the local community.

Where to volunteer? UTeach pre-service teachers may volunteer at all grade levels in many school districts including Lowell, Tewksbury, and Haverhill. There are still more opportunities in Methuen and Dracut.

Additional Bonus— As well as the skills and experience our pre-service teachers gain from volunteering, UTeach UMass Lowell offers limited scholarships of $350 to those who commit to working in a school for a minimum of 2 hours a week for 10 weeks.

Further information about UTeach STARS internships can be obtained by contacting Dr. Eliza Bobek at Eliza_Bobek@uml.edu. Current opportunities are posted outside the UTeach Office in Pasteur Hall 106.
Scholarships and Tutoring

**Scholarships**—Just as important internships are to UTeach UMass Lowell pre-service teachers, UTeach UMass Lowell also provide them with some financial incentives to enable them to complete the program. In 2013 the following scholarships were awarded:

1. **Mary, Joan and Nancy Scholarship** of $1,300 was awarded to Corinne Clifford (Atmospheric Science).

1. **GSE Advisory Board Scholarship** of $1,200 was awarded to Matthew Desmond (Mathematics).

2. **Nettie Ginsburg Altshuler Scholarships** of $500 were awarded to Michael Forsyth and Nicholas Forsyth (both Computer Engineering).

2. **Loddy Weisberg ’53 Memorial Scholarships** of $2,825 were awarded to Daniel Packard and Eduardo Beato (both Mathematics).

2. **Education Awards** of $1,000 were awarded to Erinn McLaughlin and Stephanie Bellerose (both Mathematics).

4. **Alice Fluer Zamanakos Scholarships** of $3,000 were awarded to Michelle Lowder and Ashley Bretton (both Biology) and to Anna Baturin and Jessica Flynn (both Mathematics).

**Tutoring**—In addition to the above scholarships, many of our UTeach pre-service teachers worked as a Ramp Up Math Tutor receiving $10 an hour for tutoring for 12 weeks at either Robinson or Stoklosa Middle Schools in Lowell. The Greater Lowell Community Foundation provided the funding for this tutoring program.

Eduardo Beato, Sambath Chea, Everlyn Galloway, Brian Gold, Laura Igoe, Jason LeBlanc, Corinne Clifford, Luisanna Crespo, George Katsaros, Randy Phan, and Nicholas Rossetti tutored at the Stoklosa School.

Sarah Cote, Matt Desmond, Randy Phan, and Seamus Beirne tutored at the Robinson School.
UTeach Partners Dinner 2013

UTeach UMass Lowell’s second annual Partners Dinner was held on November 21 at the Inn and Conference Center in Lowell. What started out as the ‘Mentor Teacher Appreciation Dinner’ last year has now grown to incorporate our partners, UMass Lowell faculty advisors, and of course the UTeach interns. The schools in the districts of Lowell, Dracut, Methuen, Chelmsford, Tyngsborough, and Lawrence, were represented by teachers, principals, superintendents, and science/math curriculum coordinators. Our partners who came were Ranger William Morton and Sheila Kirschbaum from the Tsongas Industrial History Center, and Professor Steve McCarthy and MaryAnn Picard from M2D2. The UMass Lowell faculty advisors who came were Professor James Graham-Eagle (mathematics) and Dr. Naomi Wernick (biology). Both these faculty advisors has taken our UTeach interns under their wings to ensure that they meet the math and science coursework criteria and are able to fit UTeach courses into their schedules.

The evening began with a welcome and a series of speeches by UTeach interns Erinn McLaughlin, Daniel Packard, Ashley Bretton, and John Romano, mentor teacher Libby Often, and Ranger William Morton.

Erinn and Danny talked about their experience of being involved in the Project-Based Instruction course. Ashley spoke of her experience at the UTeach Conference in Austin, and leading the student organization. Finally, John gave a very insightful account of working as an intern with M2D2 and Lowell High School.

Libby Often gave a lively, entertaining account of her experience mentoring UTeach interns during the Project-Based Instruction course and Ranger William Morton related his experience of the school trips to the Tsongas Industrial History Center and what he saw the students achieve. However, we must not forget as to why we hold this dinner in the first place. It is indeed to show our appreciation of those mentor teachers from the various school districts we work with who allow our UTeach interns into their classrooms and guide and encourage them as they progress through UTeach.
There is no doubt that UTeach UMass Lowell is growing. We are now offering more courses, and more students are in the pipeline for graduating with an initial teachers’ license. In the Spring of 2014 we will see our first two graduates, and in 2015 we will see at least 15 of our interns graduating. Our home in Pasteur 106 is getting smaller by the semester as more and more STEM majors opt to follow the UTeach pathway into the teaching profession.

In the two years we have been in operation at UMass Lowell, we have formed many community links with the local school districts. Our interns have reached out to many of the schools offering their service as volunteers. Our master teachers have provided valuable professional development opportunities for Elementary and Middle School teachers. We work very closely and collaboratively with the faculty from the Graduate School of Education, Francis College of Engineering, and the College of Sciences. We also work very closely with the school superintendents, administrators, and the teachers from Lowell, Methuen, Lawrence, Chelmsford, Dracut, and Tyngsborough, and we look forward to working with other school districts we have reached out to such as Billerica, and Tewksbury.

We are delighted to be partnering with M2D2 and for the unique experience they have provided our interns. We thank our donors—Cabot Cooperation, United Technologies, Greater Lowell Community Foundation, and various others for the scholarships for our interns. Last but not least, we are grateful to the UTeach Institute at the University of Austin Texas for enabling us to replicate UTeach at UMass Lowell and for connecting us with Verizon Foundation.