



## Universities and Invention/Entrepreneurship Education

Invention and entrepreneurship education programs are flourishing in the national K-12 environment. Predominantly under the Invention Convention umbrella, though also in other youth-focused programs, organizations are driving invention education towards more formal curricula and in-school teaching environments. And a whole range of entrepreneurial resources are available for K-12 from leading brands like Junior Achievement, Network for Teaching Entrepreneurship (NFTE), and others.

Surprisingly, only a handful of these programs have reached out to universities to work together in their education efforts. Nonetheless, the opportunities for invention/education programs and universities to work together are rich. Particularly, K-12 invention/entrepreneurship programs inherently promote STEM activities, which can equip students for an excellent selection of STEM-oriented careers and universities as follow-on to their ongoing invention and/or entrepreneurship education.

Universities have extensive opportunities to partner with K-12 invention and entrepreneurship education programs, and these interactions are more than mutually beneficial to both parties; they are an essential part of designing a best-in-class K-12 invention and entrepreneurship education program.

### Potential University Roles in Invention Education

Universities are not single-minded entities, but rather a diverse collection of many different interests collected under one brand and encompassing leadership. Within any given university, one can find academic teaching interests, corporate development and outreach arms, alumni engagement programs, sporting “businesses” (after all, these are real money makers for many schools), research centers, tech parks, public/private partnerships, and many other endeavors; that is to say that universities are complex entities.

Partnering with such an organization then requires focus on specific opportunities and on how each party can respectively benefit across a broad range of interpretations. In some cases, a partnership might be attractive because a single professor is excited about a program for its synergy with his/her own interests. Or, it might map well with a department’s stated goals, such as high school engineering outreach programs to get kids interested in engineering at college.

It might tie into research being pursued, such as education curriculum reform in schools or educational research funded by the National Science Foundation (NSF) or National Institute of Health (NIH). It could even sync with global efforts within the university to differentiate itself, such as a new capital funding campaign and school marketing effort about elevating the level of entrepreneurship across all disciplines in the university.

Partnering with a university thus entails discovering and identifying those mutual interests and alignments. For instance, generically, here are some places where invention and entrepreneurship education find a great deal of departmental synergy:

- **School of Engineering:** Engineering schools are constantly reaching out to educate students about the fundamentals of engineering, and the benefits of pursuing a career in engineering. Engineering schools often have outreach designed to expose kids early-on to engineering concepts and to excite potential pupils about taking more courses in science, math, engineering, and other technical topics. Engineering schools also often run early talent identification programs to identify students who are more attractive for recruitment.
- **School of Business:** Business schools endeavor to expose students to the broad disciplines that drive any business, ranging from marketing, to sales, to finance, to operations, to human resources, and beyond. More than other schools in a university, Business schools will typically work off of case studies, using real-life examples to teach business concepts. It's not unusual for business schools to engage with local startups or businesses in order to advance this experiential learning. Many advanced courses in business schools will prompt students to form teams to launch businesses as part of entrepreneurial coursework and to evaluate existing business models for improvement. Individual elements of the school will pursue research in areas of interest to faculty, including topics about innovation and entrepreneurship. Indeed, it's common for a school of business to also have an entrepreneurship center, and possibly a startup accelerator program designed to try to help advance student interest in starting businesses.
- **School of Law:** Law schools teach all elements of law, including many pertinent to this paper; all law schools will include courses on intellectual property, including patents, trademarks, copyrights, etc. Law schools also often run law clinics for in-school and local businesses, where law students are putting into real-life practice their learning by helping people with their patent filings, trademark requests, etc.
- **School of Education:** Schools of education are of particular interest to this discussion because they are instructing next generation K-12 educators. Schools of education are keen not only on the practice of teaching, but also research on how learning is best accomplished. Schools tend to have certification programs for various elements of K-12 teaching, including training new gifted and talented teachers, who generally tend to oversee school invention convention programs. Education schools care about curriculum design, new models for teaching, best practices in teaching, assessment methodologies, research, and more. Education school students are very often sent into local partner schools for apprenticeship and internship teaching experience, and are tasked with learning new teaching techniques to pass on to the schools.

- **Alumni Relations:** Schools are businesses, and businesses need income to operate. For universities, and in addition to getting funding from student tuition and housing fees, funding from alumni donations plays a big role in driving new and existing initiatives at the school. But it's not always about money. Engaging alumni in coming back to campus and getting involved with students – transferring knowledge and providing encouragement – is a key part of alumni outreach. Alumni bring that real-world perspective that textbooks cannot give.
- **Foundation:** As part of the general efforts to raise money for the school, universities often have a foundation or other arm of the university tasked with outreach to corporations to form public/private and other partnerships that will drive funds for research labs, students, faculty and other infrastructure to advance the pursuit of knowledge. Foundations have fundraisers who call on corporations, individuals, government bureaus and other partners who can fund and otherwise support research efforts at the university.
- **Facilities:** Above all, universities are mini-cities, with stores, restaurants, sporting areas, housing, parking, etc. Lots of things needed for large scale conferences or competitions as found in K-12 invention and entrepreneurship events. Universities simply know how to handle a lot of people smoothly.

So universities have people, funding, facilities, and other resources that can be invaluable to K-12 invention and entrepreneurship programs.

## Case Study: Connecticut Invention Convention

The Connecticut Invention Convention (CIC) is a 33-year old non-profit in Connecticut with the stated mission of having “every child in every school in Connecticut be an inventor and/or entrepreneur once, better twice,” in their K-12 career. It operates in more than 250 schools across Connecticut with formal invention education programs, impacting close to 20,000 kids each year.

For more than 16 years, UCONN, the state land grant University of Connecticut, has been partnered with the CIC to bring the program into schools across the state. The main proponent of the partnership has been the School of Engineering, which provides funding each year to subsidize/sponsor the statewide “finals” event at the UCONN Gampel Pavilion, the main arena for the school’s national champion basketball teams. Each year, some 6,000 people come to the arena to watch and participate in the finals of the Connecticut Invention Convention. More than 500 judges, engineers, business people, educators, and other sponsor-specific judges convene to judge more than 1,000 K-12 entrants, looked on by parents, national media, legislators, and other active participants in the innovation ecosystem in Connecticut.

For the School of Engineering, it’s a festive day. The UCONN Dean of Engineering welcomes guests, and proudly informs them about the great things happening on campus. The kids will wear baseball caps from the School of Engineering, as well as T-shirts with the UCONN and other sponsor logos. Current year engineering students act as show volunteers, contributing greatly to the event’s success. For instance, corporate sponsors are ushered around by

UCONN students, and greeted by the UCONN's CIC board members – UCONN has three faculty who serve on the Board of Directors. Nearly a dozen engineering stations are set up around the concourse, allowing visitors to see engineering in action, across all the various disciplines taught at UCONN – that is, a table for Civil Engineering might have experiments in which the kids can learn about bridges by building across long expanses with different materials, while a table for materials sciences might show how ceramic tiles on the Space Shuttle protect the inside of the spacecraft. Parents are given tours of campus while the kids are “on the floor” being judged by the judges (no parents allowed). National media like the Disney Channel and others are on hand to document kid inventors and entrepreneurs in action, and the school's food courts and concession stands do a brisk business, bringing more revenues into the university. All in all, it's a great day to showcase UCONN and its engineering programs – an important opportunity for the school since for nearly all of these kids and their parents, this is their first visit to UCONN.

The Engineering School sees this program as an important part of their outreach mission to engage and influence youth towards STEM careers. Over the years, the School has found that by the end of Grade Eight, kids have generally determined their high school course of action; multi-year tracks for the sciences, math, and other relevant courses are selected by students at the end of the eighth Grade, meaning the Engineering School needs to get to the kids a lot early to be influential. The CIC starts inspiring them young, with the earliest participants coming from Kindergarten programs.

The School also sees this as early talent identification; the best students in the Finals from the Eighth Grade each year are awarded scholarships to take part in the School's Early College Experience (ECE) program, by which they gain free access to STEM coursework offered by UCONN during high school, mostly through live in-class teaching experiences. This gives UCONN an inside track into the best inventors in the state.

The School of Business is likewise engaged with the CIC. A huge supporter of startups through various undergraduate and graduate startup programs, as well as of small business as the operator of the U.S. Small Business Administration's Small Business Development Center (SBDC) program in Connecticut, the School of Business is interested in fostering expansion of business activity throughout the state – and youth invention and entrepreneurship is part of that mission. Some of the best students each year are selected to enter the CIC's Next Step Inventors program, which is a highly mentored, resources-rich experience, and the School of Business has helped make this program a success. For instance, CIC student projects have historically been selected to serve as real-world case studies for students to work on during coursework. Exceptional businesses might warrant one of the MBA teams in the Connecticut Center for Entrepreneurship and Innovation program wherein MBA students work to solve strategic challenges for businesses. For instance, in 2012, an MBA team from UCONN received global media attention when helping 13-year old Mallory Kievman with her Hiccupops ([www.hiccupops.com](http://www.hiccupops.com)) invention rollout. A team of four students collaborated with the student inventor/entrepreneur to define her market entry strategy. A headline for an article in the New York Times detailed, [“A 13-Year-Old Enlists M.B.A. Students to Build Her Start-Up.”](#) More

articles, TV appearances, radio interviews, and the like followed, resulting in extensive growth for the startup and great publicity for UCONN.

The School of Education trains a good proportion of Connecticut's new K-12 teachers each year, teaching them as part of the school's undergraduate and graduate teaching programs. Invention and entrepreneurship education is part of this training. The School of Education has helped the CIC develop its professional development program, an annual fall tradition for exposing teachers to the process of teaching invention. The School has also helped with sponsored assessment studies, which, in addition to raising money for university research around assessment, has the goal of advancing knowledge about how to properly assess the impact of invention and entrepreneurship education on later life career success. Graduate students and faculty have been engaged to help expand the CIC's curriculum, a nation-leading four volume set of activities geared around the invention and entrepreneurship teaching process.

Even the School of Law has been involved in the past, with its IP Law Clinic wherein students have gotten advice on legal issues – including help with filing for provisional patent applications, full patent applications, and trademark issues.

Other areas of the university have been engaged as well. The Alumni Association has helped find former CIC students in its extensive database of state students, and the fundraising arms of the university have helped with the collaboration around raising money from donations that could drive research at the university. The facilities folks have also helped design floor layouts for the finals, and make sure discussions with the fire marshal and EMT personnel are on target for the big finals event.

For UCONN in general, the CIC is a high visibility partnership that drives media exposure for the university, brings revenues onto campus through event participants as well as joint grant applications, expands the clout of the various schools by real-world engagement, and raises the stature of the university in the eyes of all involved. It's a huge win/win for everyone, especially the kids.

## **Other Examples of University Engagement**

There are other examples of university engagement from around the nation. Georgia Tech is hosting the K-12 Inventure Prize program ([inventurechallenge.gatech.edu](http://inventurechallenge.gatech.edu)) which coordinates student inventors/entrepreneurs across approaching 100 schools in Georgia. For Georgia Tech, it is the outreach group within the School of Engineering that runs this program, alongside other programs like FIRST Robotics. Many of the same benefits of the UCONN sponsorship apply here as well – visibility, leadership, early talent identification, and so on.

In Iowa, the Jacobson Institute for Youth Entrepreneurship and the College of Education at the University of Iowa are extremely active in creating curriculum, teacher professional development, online training and certification, and other materials to drive K-12 invention and entrepreneurship success. Their Biz Innovator ([bizinnovator.com](http://bizinnovator.com)) and STEM Innovator

[steminnovator.com](http://steminnovator.com)) programs are designed to help elevate the teaching of invention and entrepreneurship in youth situations – with the latter designed for STEM learning environments.

It should be worth noting that back in Connecticut, plans are underway for a 2016-2017 regional expansion that will insert a new layer into the completion by having four regional conventions, creating a middle layer between the local school invention conventions and give the CIC more space at Gampel. These regional competitions will be held at four state community colleges across Connecticut.

## **Final Thoughts**

The decision to involve your local university in your invention and entrepreneurship programming can be a vital and mutually beneficial one, and it is hoped that these examples provide you with the incentive to expand those relationships. The STEMIE Coalition's goals decidedly advocate establishing strong links to school programs, particularly the engineering and education programs at those universities. The STEMIE Coalition ultimately hopes to link the schools together themselves across all states so that we could be an enabler in driving change across the U.S. K-12 landscape.