

DRAFT

Supporting Beaver's Vision for Education:

Science and NuVu

Beaver's Science Program

*We have to foster – you see, every little kid is a scientist. They're just so damn curious, they inevitably are. And too much of our social and educational system tends to squelch this, because oh, the important thing is to get the right answer. Well, it's not the important thing when you're doing science, because people don't know the right answer. So, you're asking instead, "Am I thinking in an interesting way? If I come up with an approach that..." So, that puts a great premium on individual imagination, just what counts in a poem, whereas the image of science is nothing like that. The student gets the impression that there's no room for individual scope because you learn how to do everything the right way. Well, that means only one way. There's not only one way. Even in mathematics the crucial invention comes from people who do it a different way than others. **Dudley Herschbach, Nobel Laureate in Chemistry.***

Inquiry-based science education (IBSE) has proved its efficacy at both primary and secondary levels in increasing children's and students' interest and attainments levels while at the same time stimulating teacher motivation. IBSE is effective with all kinds of students from the weakest to the most able and is fully compatible with the ambition of excellence. Moreover IBSE is beneficial to promoting girls' interest and participation in science activities. Finally, IBSE and traditional deductive approaches are not mutually exclusive and they should be combined in any science classroom to accommodate different mindsets and age-group preferences.

*Due to the nature of its practices, IBSE pedagogy is more likely to encourage relationships between the stakeholders of both formal and informal education. And it creates opportunities for involving firms, scientists, researchers, engineers, universities, local actors such as cities, associations, parents and other kinds of local resources. **European Commission: Science Education Now: A renewed pedagogy for the future of Europe.***

While leading thinkers in the world of science stress the need for inquiry-based pedagogy, with an emphasis on classroom experience that connects students to the world of science today, traditional science education continues to stress a curriculum and classroom environment that focuses on learning science in departmentalized silos connecting students to standardized tests rather than authentic research. Beaver's Science Department will continue to develop science curriculum that responds to thinkers like Herschbach and organizations like the European Commission. In the upper school as part of the core curriculum, rather than the elective program, students would engage in courses such as biotechnology, engineering and robotics, design for development and environmental sciences.

Goals

- With the area's most forward thinking science curriculum and most exciting science facilities, Beaver will attract more applicants who are interested in science.
- Through real world engagement, push all students to develop as scientific thinkers, thus drawing more students to even more sophisticated emerging sciences in the senior year.
- More graduates will study sciences at institutions like MIT; Johns Hopkins; Carnegie Mellon and the University of Chicago.
- Create research opportunities for students at places like The Broad Institute and DFCI.
- Given that students will be conducting research on emerging sciences rather than traditional sciences, they will have more opportunities to present at local, state and national conferences.
- Finally, this is yet another effort that will set Beaver apart from other institutions in New England.

The Process

- Beginning in January 2011 the Science Department will work with an organization such as the Department of Curriculum and Instruction out of the College of Education at the University of Washington to redesign our science curriculum.
- Beginning in the fall of 2011 the class of 2015 would be the first to experience our new science curriculum.
- Our science facilities will be redesigned in the summer of 2011 to accommodate our new programs.

Science Facilities

Beaver's current science facilities have served the school well since they were constructed in the mid-'60s. Given the changes in the world of science and the possibilities for science education, Beaver needs to move beyond the notion of physics, chemistry and biology labs and design a facility that can respond to integrated sciences, inquiry based learning and the unanticipated emerging trends in science education.

Goals

- Create science classrooms that allow classes to move easily between research and instruction and lend themselves to supporting all kinds of science instruction.
- Add two classroom spaces (expanding from four to six) so that all science classes in grades six through twelve can be taught in dedicated science classrooms.
- Add a greenhouse to facilitate the study of environmental science.
- Create an inventors workshop, equipped to support student generated projects connected to classroom work, NuVu, and independent studies.

The Process

- The school has engaged Kennedy Violich Architects and is close to completion of the design of the facility.
- Begin construction in the late spring of 2011.
- Move into the facility in the fall of 2011.

NuVu Vision

“Colleges have been universally positive about Beaver’s participation in the NuVu program, many calling it an ‘exciting’ inspiring opportunity for Beaver students. ‘I am excited about the future of Beaver,’ wrote one college admission officer. Others stated they would look favorably upon NuVu participation as a factor in admission.” Peter Gow, Director of College Counseling, who contacted 180 colleges for their perspectives on NuVu.

“Among Beaver’s faculty there is already great enthusiasm about NuVu. Our teachers have plenty of pedagogical wisdom to offer around topics like collaboration and differentiated instruction, while NuVu brings amazing resources to the table including experts that are doing cutting edge work in a wide range of fields. It’s tough to imagine a more exciting combination.” Rob MacDonald, Math Department Chair.

“It (NuVu) makes the creative kids think analytically and the analytical kids think creatively.” Beaver NuVu Student.

In November of 2010, a group of recent Ph.D. graduates of MIT approached Beaver with an idea for an innovation center for high school students called NuVu (New View), created by these young PhD’s in collaboration with MIT professors. In our 2008 Strategic Directions, the Board of Trustees and Management Team expressed a need for educational experiences for students that emphasized creativity, innovation and flexibility of mind. In addition we committed to finding experiences for students that would connect them with private and public sector organizations and learning institutions in the Boston area to provide increased opportunities for authentic learning experiences beyond the traditional classroom. Each term 20 – 25 Beaver students spend the entire day for eleven weeks in a facility adjacent to MIT working on projects with some of the finest minds in the academic world and the private sector. Students work in a design studio environment on a series of two-week projects related to a central theme. At the end of the two weeks, students make presentations that are critiqued by visiting experts from the MIT and Harvard community. At the end of the term students present their work at the MIT Museum.

Goals

- Provide access for Beaver students to the extraordinary intellectual and physical resources of the MIT and Harvard community.
- Provide an environment where students are required to work in a creative and innovative context, where they integrate skills such as physics, political science, mathematics, design, chemistry, project management, group work etc.
- Encourage students to push their work beyond NuVu to develop independent studies both during the school year and over the summer.
- Provide an experience that truly differentiates students as they apply for college.

Process

- In the spring of 2010 Beaver conducted a pilot project with seniors to refine the program before its full launch in the fall of 2010.
- Given that the Board of Trustees does not want to charge any students for the NuVu program, approach donors to secure funding for the first two years of the program.
- Given that 20 – 25 students will be studying off campus each term, over two years expand the size of the upper school by 20 – 25 students, making the program self funding.
- Work with the founders of the NuVu program to help them grow enrollment to 50 students by attracting students from independent, public and charter schools.

This may be the most exciting and innovative project that Beaver has ever launched. It dramatically differentiates Beaver from all schools in New England and beyond.