

## Indiana Jones and the Cornstarch of Doom



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My past 'mandatory end-of-year editorials' have been written over the Thanksgiving holiday weekend, generally fueled by tryptophan-induced euphoria, a compulsion to avoid too much family interaction, and fear of an irritable editor. These have been upbeat listings of CAER's annual accomplishments and awards, with little bad news to report. This year will depart from that theme; not that we have bad news or funding disasters, or any fewer staff accolades, but rather because my Thanksgiving didn't go as planned...

I spent the break working with my son, Kelden, on his Science Fair Project. This is a big deal when you are 6, and more so if your sister has won her grade three years in a row. AND, you managed to find a way to focus your kindergarten project the previous year on making fake Sasquatch footprints that all the 5th-graders thought were really cool and wanted to talk to you about even though you're a kindergartener.... It's a lot of pressure for 1st grade. Getting him to focus on valid experimental science was not helped by his fascination with the titular mythical archeologist - Indiana Jones. He has the last movie memorized (which was as good as the others when viewed without nostalgic bias), and was determined to do something related. Aliens being too difficult, he settled on how to escape from quicksand.

Unfortunately (from a certain point of view), quicksand is not common in Kentucky, so we needed another source of non-Newtonian fluid behavior. Luckily, as with everything else, Google had the answer. Here we get to the point captured in the picture: Kelden, me, the table, and most of our kitchen covered in a fine layer of cornstarch. If mixed in the correct proportions with water, this fluid will become non-Newtonian. (It acts like water if you move through it at slow speeds, but acts like a solid if you try to move quickly). The experiments went well, except that Lego Indiana Jones floats, requiring a switch to Tony Hawk on a skate board, and we determined how much cornstarch is required and how slowly to move for Indy/Tony to escape from the "quicksand."

How does this relate to CAER, energy and Kentucky? As I walked him to the school bus on Monday discussing the difference (one more time) between Newtonian and dilatant fluid behavior, and listening to him dream up ways that you could use this stuff to stop cars, trains and bad guys, it occurred to me that somewhere between here and college, we go off track with math and science education. Somewhere the fun gets knocked out of it and the interest slides into apathy. How and why do we miss the excitement of discovery in teaching about science, technology, engineering and math (STEM)?

The Pritchard Committee on Academic Excellence recently released an update on the Kentucky educational system's progress in achieving Top 20 status by 2020. Kentucky fourth grade students rank 9th in the nation for science scores. This drops to 22nd by the eighth grade, and by the time they reach college, only 29% of bachelor degrees are awarded in STEM fields. This places Kentucky 44th in the nation in our ability to produce a workforce to meet the demands of an increasingly STEM-dominated future.

There are opportunities to recapture the imagination of students and interest them in STEM careers. Talking to students and communities about the challenges of providing enough energy in the future certainly sparks this interest:

How do we use biomass? How do we burn coal without releasing CO<sub>2</sub>? Can we use algae to solve both problems? Their ability to *imagine* a future, different than what we now *know* are the limits, holds the opportunity to reinvent Kentucky and create prosperity for its students.

We have some good examples of how this can happen. The Kentucky Legislature last session instructed the STEM Taskforce to explore how to use renewable energy issues to attract students to STEM courses, recognizing this as a key need for developing future innovators. Doug Keaton at the Russell Area Technology Center has developed a popular Alternative & Renewable Energy program, with his students designing, constructing and operating a small wind generator, solar array, and storage system to power the hallway lighting.

Energy can spark the imagination of students, and keep them interested in STEM disciplines if we can make the links to keep this interest alive. I am very excited that the keynote speaker at the 3rd Energizing Kentucky Conference ([www.energizingkentucky.org](http://www.energizingkentucky.org)) is Jared Diamond (one of my all time favorite authors). His book, *Collapse: How Societies Choose to Succeed or Fail* explores how the choices we make as a society in using and preserving our environment can determine our success or failure in the future. One such choice we face now is how we will provide our children with the tools they need to address the energy and environmental needs they will inherit from us. If we do not increase our success in STEM education, we run the risk of leaving them unprepared.

But, to get there, our students must be allowed to know the fun and fascination of discovery. Hopefully, Kelden, who is cursed with two engineer parents, will someday look back at what is quickly becoming known as the cornstarch weekend as the time he realized "I can come up with things they didn't think of."