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### **VEXATION**

Nearly every elementary teacher in the state of Delaware uses the same science curriculum. A state-sponsored organization is responsible for packaging the curriculum based upon units from the Full-Option Science System (FOSS) and Science and Technology for Children (STC) into "kits" with all necessary materials to carry out each unit. The same organization handles the professional development for the kits. While there is great utility in a common set of statewide science units (ones that are well-articulated with the state content standards), there are several significant problems with the program.

The first problem is that these science kits are flawed, based as they are on incorrect assumptions about how young children think scientifically (Metz, 1995; Metz, 2004). For example, the STC units explicitly state that they do not ask students to draw conclusions until they are in the third grade. Other kits misrepresent the enterprise of science such as asking students to measure the circumferences of the rocks they are exploring — a meaningless pursuit to a geologist, but intended to give students practice with measuring. While these kits are grounded in laudable pedagogical principles (e.g., targeting big ideas in science with inquiry-oriented lessons), they fall short in the implementation of inquiry, the treatment of content, and/or the representations of the scientific enterprise. Even if the curricular modules were better-aligned with current educational theory, the problem of teacher implementation and adaptation would remain.

The second problem facing this statewide program is aligning the reform-oriented curriculum with teacher beliefs. We know that transforming teacher practices cannot rely only upon curricular materials (Ball & Cohen, 1996). Teachers' beliefs about knowing and teaching need to be accounted for (and often changed) if we expect high fidelity in the implementation of reform-based curriculum. Most science professional development is structured almost entirely around practical details of implementation: they do not address the deeper constructivist and epistemological ideas that should be embedded in teaching these lessons.

Finally, even if the lesson and kits represent the best ideas about teaching science and even if all the teachers aligned with reform-oriented inquiry teaching, the lessons would still need to be modified. There is no such thing as a "universal" lesson, because each teacher needs to bring to bear his or her own pedagogical content knowledge and understanding of their school and the students in order to transform the materials so they are appropriate to their particular situation. Each and every good teacher makes changes so the lessons fit with their own ideas about what good teaching entails as well as the variables specific to their own classroom community. However, as essential as such practices are to effective teaching, such considerations are absent from the professional development or the broader conversation about effective science teaching in the elementary grades.

A parallel vexation derives from the body of research on teacher induction. More and more work reveals that approximately the first five years of a novice teacher's career are critical to the formation of pedagogical practices, professional vision, and even retention. Despite promising work demonstrating the power of a well-designed induction and mentorship program for new teachers (for example, Luft & Patterson, 2002), little is being done at the university or state level to organize such a program. While I do not have the resources or expertise to create a comprehensive induction program for the state, I do have the ability to lay the groundwork that could cause such a program to spontaneously self-assemble online.

### **VENTURE**

I propose creating a specialized social networking forum where teachers can come together to discuss their lessons and teaching strategies. This site would differ from existing sites (which range from district- or school-wide discussion forums to an email list servers to sites such as [tappedin.org](http://tappedin.org)), because it would rely upon artifact-centered discussion. Artifact-centered discussions are just that: discussions that take place online in the presence of a specific artifact that the online community is built around. Consider the online photography site [flickr.com](http://flickr.com) for a moment. Users come together and share photographs, discuss them (with special tools for calling out specific areas of a picture), tag them with keyword markers, and form special-interest groups that have their own sub-forums. The website is optimized around having those conversations, linking from one picture to another is much easier than in a "vanilla" online forum.

Another artifact-centered discussion community is [epicurious.com](http://epicurious.com), a cooking website where the artifacts are recipes (both user-created and derived from cookbooks and magazines). Each recipe includes its own commentary thread so that when you are ready to cook from the recipe, you do so knowing that most people think it has too much salt, or would be a lot easier to prepare if you combined two steps, and so on. On [epicurious](http://epicurious.com), the comments are mainly about how the individual cooks varied and implemented those recipes, rather than about how much they liked (or didn't like) them.

An artifact-centered discussion forum for teachers would likely center on lesson plans. Much like [epicurious](http://epicurious.com), my proposed website could help teachers connect with other teachers who are using the same lessons in order to share ideas about modifying and implementing those lessons. Teachers in the state of Delaware (and likely more broadly across the nation) comprise a nascent and under-connected community of practitioners that could be brought together in a powerful way by such an artifact-centered discussion site. The primary purpose of the site would be to coordinate discussions of the existing curriculum. As the teachers think about teaching a specific lesson, they can check online to see what other teachers in the state decided worked and didn't work, and what changes they made. After teaching the lesson, teachers can engage in critical reflection of their own implementation and record ideas about future transformations. Such a place could support both reflection and induction as teachers come together to figure out what works and doesn't work in their classroom.

Another locus for discussion could be video recordings of teacher practice. Instead of providing the teachers with case studies to discuss (although we might "seed" the site with a few of those), teachers could upload videos of their own teaching for discussion and analysis. It has become exceedingly easy for amateurs to produce so-called video podcasts with either inexpensive video cameras or just simple web-conferencing cameras hooked up to laptops. If the site supported the right kind of interaction and discussion, teachers could not only share comments about lessons, they could critically discuss their own and others' teaching strategies. Such a site would draw on some of the underlying philosophy of lesson study, but modified accommodate physical distance and asynchrony of the internet.

This online community, if successful, would allow novice teachers to interact with veteran teachers (and potentially also university faculty and STEM experts) in a space outside the standard school environment. Teachers of all experience levels could use this community as a place to develop their own ideas about and confidence in teaching, unconstrained by particular school dynamics. The potential for improving teacher social capital is large - new teachers can discuss their ideas and ask for help in a less-threatening environment, teachers and other professionals at all levels of experience can provide moral and intellectual support to each other as they take on more challenging reform practices, and can develop online identities as local experts in particular curricular units. Such an environment could also help veteran teachers who want to change their own practice. By providing an environment where they can connect to other like-minded individuals, novice and veteran teachers alike will be able to develop peer connections, knowledge, self-confidence, and mentoring connections that can help them transition their practice into new modes of reform-oriented teaching.

While the specific details about such an online forum have yet to be determined, I believe the time is right to create something that can really bring together novice and veteran teachers so that they can talk about their craft. The statewide curriculum in Delaware affords this unique opportunity in creating such a large potential network of teachers.

This is a crucial time in this research agenda - I need critical discussion about the vision for the online community and more empirical analyses of what works and doesn't work in online and offline professional development before I start thinking about details of implementation, as well as help thinking about a framework with which I could use the online community to carry out research projects (even such straightforward ideas as thinking about what success and failure would look like in this proposed community).