Tearing Down the Silos in K-12 Curricula

By Inservice Guest Blogger

Seven key drivers of the movement to remove age-old silos that are holding STEM teachers and students back in the 21st century classroom.

Organizational silos are pervasive in the educational sector. Like the grain silos that farmers use to separate different agricultural products, these silos separate different subjects, teachers, departments, and even thought processes. Highly resistant to change, these silos block easy access to the information they hold, thwarting positive change and progress across K-12 schools and districts.

Consider the K-12 curriculum, for a moment. Historically, the siloed or segmented curriculum has been fairly commonplace in the classroom. Math teachers focused on math, science teachers taught science, and English teachers focused on English—and never the twain shall meet. Siloing subjects is easier for schools because it's easier to map out curriculum. But as students focus on each topic individually, they may be less proficient with the material, since they do not study complex, real-world applications or understand how interrelated subjects affect each other.

Fast-forward to 2016. The instructional environment is becoming decidedly "flatter," as more teachers look to one another—and to other subjects—in an effort to make their curriculum more engaging and interesting for students. By giving pupils hands-on, real-life experience in STEM (science, technology, engineering,

and math), for example, teachers can effectively bring these subjects to life and ignite a passion in their pupils that siloed curriculum can't touch.

Here are seven key drivers that can help accelerate that removal of constrictive silos in today's STEM classroom:

- **High demand for integrated learning.** Integrated learning has gained renewed strength in education with the growth of STEM, among other progressive learning models. STEM not only provides more hands-on application, but it better prepares students to analyze and learn critical thinking skills that will be valuable to their future education and professional pursuits — both inside and outside the STEM fields.

- **A 21st century workforce that requires 21st century skills.** As more educators recognize the importance of interdisciplinary curriculum, fewer students will participate in siloed subjects as they learn how to apply problem-solving skills. As a result, those students will be more prepared for 21st century learning and professional life, and will also gain a greater motivation to learn. For example, in an integrated physics and chemistry (IPC) curriculum, the class would focus on understanding each discipline and how it correlates with the other. Students would gain a deeper understanding of how the principles of both could be applied in the real world.

- **The need for real-world application experience…in school.** Integrated studies give students the opportunity to use both modern technology and social engagement to increase their understanding. It also requires more hands-on learning and real-word application. All of this helps prepare students for further education and careers. By learning within a curriculum that uses real-world applications, students develop a better grasp of the material as they see how the topics relate to scenarios outside of the classroom.

- **The STEAM movement is gathering momentum.** Much attention in education is being paid to integrating arts and language arts into the STEM conversation (i.e., STEAM). Before we can focus on this shift, however, we need to make sure the STEM subjects themselves are more cross-curricular in nature. The sciences, for instance, are often extremely siloed in traditional curricula. By "connecting the "dots" of science, chemistry, physics, and other subjects when teaching concepts, we can make the learning experience more

authentic and relevant. This, in turn, allows students to make more connections…because they didn't learn the subjects in isolation.

- **A move away from single-topic lesson plans.** The conversion to de-siloed learning in the STEM disciplines will take time, but can be accomplished at a steady pace through small changes in school curriculum. De-siloed STEM learning can move teachers away from single-topic lesson plans and enable them to give students exposure to more sophisticated, integrated approaches to learning. A lesson on the human body for example, can incorporate chemical reactions, force, and other real-world concepts.

- **The need to replace antiquated learning materials.** Many states are still using textbooks that were published prior to standards revisions. In some cases, these were published prior to multiple revisions, and are no longer aligned to the majority of state standards. Using a decade-old textbook leaves teachers extremely frustrated, namely because the new standards are much more rigorous and detailed. One particularly useful resource that makes it easy for teachers to deliver lessons that cross the STEM subjects is a digital, inquiry-based K-12 curriculum called STEMscopes. Developed in partnership by Rice University and Accelerate Learning, STEMscopes was built from the ground up to meet state standards and the NGSS. Its student-centric, blended STEM learning environment helps students master standards through scientific investigations, engineering challenges, content connection videos, claim-evidence-reasoning assessments, and more.

- **A rise in student-centric technology platforms.** A key benefit of digital curriculum materials is that they allow the teacher to personalize lessons for their students and address the content in a creative way. By combining digital resources, supplemental print, and hands-on kits, STEMscopes K-12, for example, adapt to any teaching style while increasing engagement, rigor, and student achievement. Whether the style is traditional, blended or 1:1, the platform offers a variety of opportunities for integrated and hands-on learning. There is even a Spanish version for grades K-5, which further allows the teacher to meet the needs of their students. This goes a long way in breaking down the educational silos that are holding our students and teachers back.

Many argue that the silo effect that has dominated education needs to be eliminated, so today's students can more effectively develop real-world skills . The

question is, will siloed curriculum soon be considered a learning model of the past? The good news is that achieving this goal may not require a system-wide revolution. In fact, as more teachers focus on interdisciplinary studies, siloed classes may gradually become obsolete. This, in turn, will help cultivate an educational environment where even the most technical subjects can be broken down into digestible, understandable chunks and consumed by today's 21st century learners.

Alexandra Owens is a STEM Education consultant based in Charleston, SC. She taught middle school science for many years and is now completing her doctorate in STEM education at Texas Tech University.

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