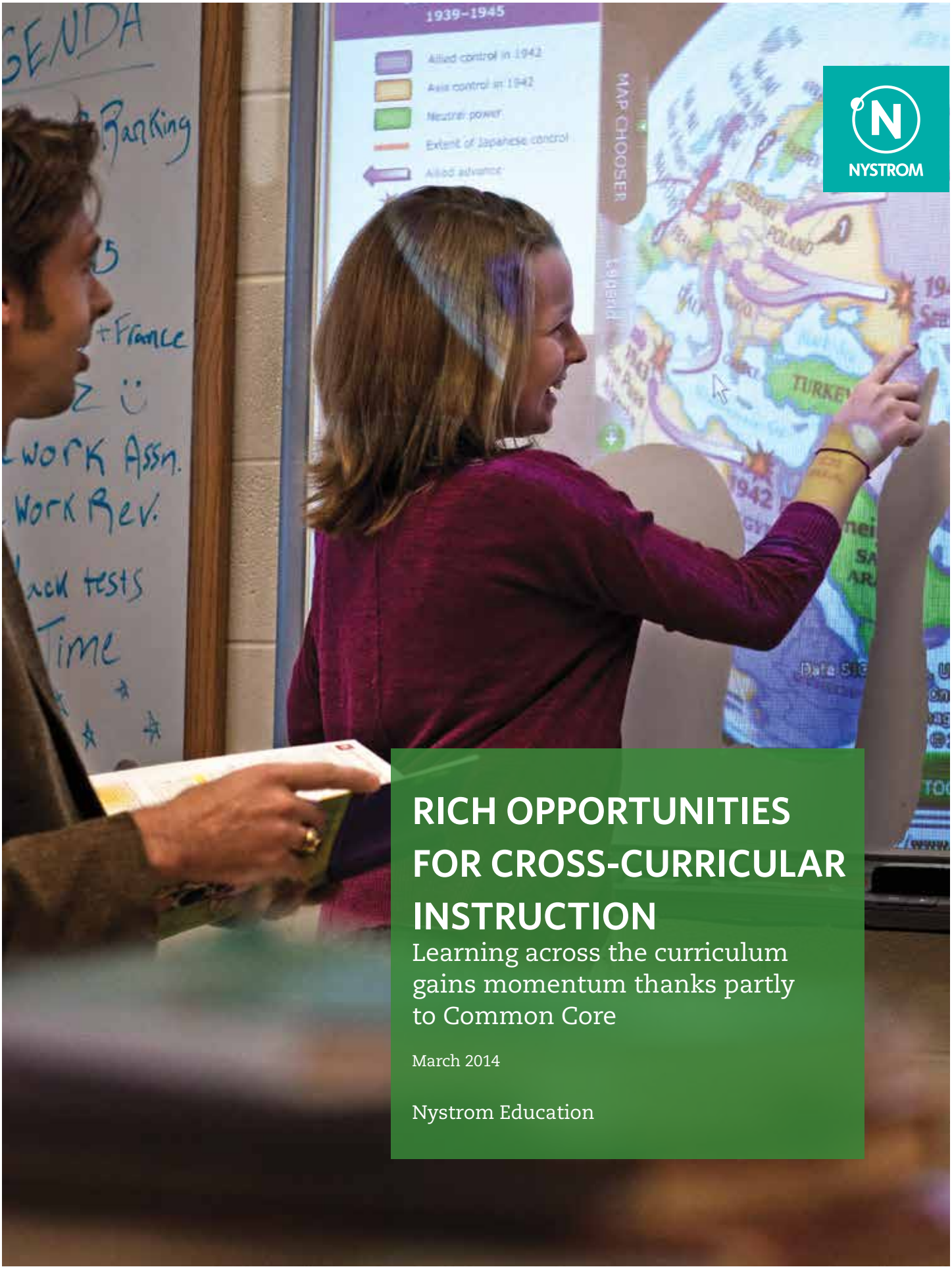

NYSTROM

RICH OPPORTUNITIES FOR CROSS-CURRICULAR INSTRUCTION

Learning across the curriculum gains momentum thanks partly to Common Core

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From the Winter Olympics, to science fiction writing, to financial planning, educators are using all manner of thematic material to bring together their curricula across subject matter and better integrate students' learning.

Some of this is prompted by the Common Core State Standards, which encourage interactions among history and language arts, math, and science, as part of the increased rigor and depth they aim to promote. While cross-curricular learning dates back at least a quarter-century or more as a concept in K–12 education, it has definitely gained traction in recent years.

Advocates of cross-curricular learning insist that it promotes deeper knowledge among students and better prepares them for college and the workplace. As Jordan Catapano writes on *TeachHUB*, "The advantage is that students will begin to see knowledge as interdependent and connected rather than as individual, isolated subjects."[1]

"There's a rich opportunity, here, for cross-curricular learning, as students truly weave together their literacy skills, along with their increased content knowledge and the application of their critical thinking skills," adds Donna Knoell, an educational consultant, speaker, and writer.

Constructing this cross-curricular architecture takes time and dedication, says Jennifer Quinn, a former elementary teacher in Chicago Public Schools who now works to develop first- and second-year teachers. But ultimately, it is worthwhile because "it helps them [students] connect learning to real life and makes learning more meaningful," she says.

Districts, schools, and teachers across the country are all taking their own unique approaches to stitching together lessons across subject areas.

FIVE OVERLAPPING RINGS

During the 2014 Winter Olympics, educators in Toms River (NJ) Schools set into motion a plan they had spent 250 hours crafting to create a cross-curriculum lesson plan for the district's more than 4,000 elementary school students. In science, students learned about the athletes' potential and kinetic energy. In geometry, they measured shapes among the flags of participating teams. In history, they learned about the origins of the Olympics. They read about eight different Olympic sports and quizzed each other afterward to test comprehension.

"The teachers worked to weave the lessons into five subject areas—math, reading, writing, social studies, and science—to overlap and connect like the Olympics' five symbolic rings," writes Amanda Oglesby in the Asbury Park Press. She notes that while the lessons were relevant to what students were watching on television with their families, they "also honed skills that are emphasized in the new Common Core State Standards."[2]

"Part of the Common Core is working on speaking and listening skills," says interim Assistant Superintendent Marianne Gaffney, who helped to build the curriculum. "It's something where they feel they're participating in the real world activity, and that makes it more engaging to them."

The notion of teachers working together among subject areas to create learning across the curriculum is nothing brand new, but in places like Toms River, it's been gaining adherents partly due to the advent of the Common Core State Standards. "The enthusiasm is through the roof," says teacher Nicole Lanza. "It's contagious throughout the whole building."[3]

Cross-curricular learning develops children's knowledge, skills, and understanding, and motivates them through stimulating and interconnected topics, according to The Historical Association of the United Kingdom. "A study which crosses subject boundaries allows for investigations that engage children's imagination," the association says. "It also gives teachers opportunities to encourage active inquiry, taking the initiative, and discussion and debate by children."

In building learning across the curriculum, The Historical Association recommends being mindful of curriculum breadth and balance, crafting real links among subjects where genuine connections naturally occur, creating coherence with one or two lead subjects in any given lesson, and ensuring children's progression in the given subjects. Cross-curricular learning should be built around key concepts, a main theme, and specific focus areas to flesh out the concepts and theme.[4]

IT'S A HEAVY LIFT

Weaving together learning across the curriculum takes a great deal of time and effort, and it is quite challenging despite the fact that teachers appreciate how it makes learning more meaningful for their students, Quinn says.

"The challenges are not push-back," Quinn says. "It's not that teachers don't want to do it. It allows you to make learning meaningful for kids by connecting learning across the many things they're doing. . . . Educators do see the value in it."

But, she says, the planning process is considerably more time consuming than when subjects are taught separately. "You do have to take into consideration the standards of all the different subjects you're trying to integrate and make meaningful," she says. "You have different standards for reading or social sciences, and then you're trying to not just pull them together, but in a way that helps kids make powerful connections."

On top of that, teachers must weave together the resources they have at their disposal, Quinn says. "It's more than just saying, 'I have this text for reading that I'm going to follow, and then I have this other text for social science.'

Schools with a great deal of turnover, or schools where teachers frequently change grade levels, face more of a challenge with cross-curricular learning, Quinn says. "It's something that many teachers plan with their colleagues or grade level partners. If you have the stability from year to year, you can build upon previous units and improve the academic experience for students."

And the Common Core State Standards adds opportunity, Quinn says."If you're already changing the way you teach and shifting your mind-set, planning cross-curricular units helps you reach the level of rigor these standards require," she says. "Teachers are still learning how to teach to Common Core. All teachers are trying to wrap their heads around the new standards and teaching in a new way."

IMPACT OF THE COMMON CORE

The Common Core State Standards and their specifications for the reading and writing of

informational text has prompted schools and school districts to take a new look at both the instructional requirements and the opportunities for cross-curricular learning, Knoell says.

"When you do content literacy, you are speaking specifically about the ability to read and write in the content areas," she says. "Comprehension of informational text is the focus. The literacy skills cross over all subjects—social studies, science, mathematics, health, music, and even art. The literacy skills and strategies are integrated into the subject area instruction, helping students construct meaning."

Teachers in many schools are stressed out over this new requirement because over time, especially in elementary schools, they have emphasized reading and writing of narrative fiction, Knoell says. "In my opinion, they should have been teaching children to read and write in social studies and science all along," she says. "And although in recent years, content reading or the reading of informational text has increased, it has not increased to the level required by the Common Core State Standards. And this is forcing teachers to rethink and to plan differently, so that their instruction and instructional time matches the requirements of the Common Core."

Because Common Core has underscored the importance of reading and writing informational text, science and social studies have had the opportunity for additional instructional time, creating more of a balance among subject areas, Knoell says.

Previously, she says, "one teacher may have emphasized reading-language arts more than social studies, and another teacher may have had an inclination to emphasize science more. If a student had a good balance of teachers, students got a good balance of subjects over time, but not everybody received that 'balance,' especially in elementary school, or in what used to be called 'unified studies.' So some students continued to receive instruction that focused mainly on narrative fiction or instruction that emphasized one particular subject.

"Now, it doesn't matter what a teacher's preference of subjects may be," Knoell adds. "Teachers are being told that reading-language arts must include at least 40 percent informational text by fourth grade, and

'INTEGRATING THINKING AND LEARNING SKILLS ACROSS THE CURRICULUM'

Although it's received increased attention with the advent of the Common Core State Standards, cross-curricular learning is not a brand new subject. In the 1989 guidebook, "Interdisciplinary Curriculum," writers David Ackerman and D. N. Perkins spend a chapter on how to integrate thinking and learning skills across the curriculum.

They discuss differences between content-oriented integration and skills-oriented integration, the contrasting visions presented and the potential for an "integrated meta-curriculum" that includes both, the types of skills needed to put such a meta-curriculum into practice, the misconceptions that could prevent such a curriculum from being put into place, and the practical side of skills-content integration.

The last section answers questions like: In which subjects might the skills be taught? How might the skill development be accomplished? How closely related will the learning of the skills be to the learning of the content? When can skills be taught in relation to the content? How might cross-curricular skills integration be organized? And which will be the focus of attention: skills or content?

Finally, Ackerman and Perkins discuss results that integration can bring about, such as improvement in thinking and learning skills, mastery of the subjects involved with deeper understanding, the ability to be more autonomous and proactive, and greater preparation to make connections between contexts that seem quite separate at first. "While curriculum content alone may give them some notes and tunes as points of departure, it is the metacurriculum that cultivates their art with the instruments of their minds."[5]

70–80 percent of the reading-language arts instruction by seventh and eighth grade."

The fact that Common Core asks teachers to ask students not just for an answer, but what evidence they found to support their answer, provides opportunities for cross-curricular learning, Knoell says. "They are being asked to find evidence in their reading to support their answers. Students are being taught to go to informational text and to cite the evidence for their thinking. That's a whole new way of reading and learning."

For example, students can study a map and not just look at the geography, per se, but also the implications for animal habitats. Examining the habitats could lead to a discussion of weather and climate, and plant and animal adaptations. Another cross-curricular connection here might lead to a classroom dialogue about a fictional story set in that geography," Knoell says. "What is the location of where that fictional story is taking place, and how does that impact character and plot development?" she asks.

Richard Byrne of Free Technology for Teachers urges educators to connect as many subjects as possible. "It's much more cohesive in moving a school forward," he says. "We're helping students see the connections between the different content areas, see the skills carry over from eighth grade to ninth grade and how the skills they've learned in language arts transfer to social studies. The research skills they learned in social studies can be applied to science. . . . By the time they graduate from high school, they have a clear sense of what they've learned, and how they can apply their skills to multiple situations."

Common Core asks that students develop skills across curricular areas, Byrne says, and looking through a cross-curricular lens often means that lessons meet the standards whether or not they're consciously designed that way. "I don't generally look at the Common Core first," he says. "If I look at the standards first and then say, 'What can I teach?,' we're doing kids a disservice, just teaching to the standards rather than giving kids a full experience."

Online tools like Google Maps can be useful in developing cross-curricular lessons as well, Byrne says. Teachers can make math-science connections around geography and the exploration of the Earth. "It's a great tool for having kids visually plan a story," he says. "Any kind of tool we can use to engage kids and get their feedback in real time can strengthen that connection between subject areas, to allow students to say, 'Oh yeah, we did something like this in science.' . . . It's important for teachers to be flexible enough to allow a student to say, 'We did 'X' in Mr. Byrne's class, and it worked really well. Can we do it here?' Aside from technology and standards, it comes down to how flexible a teacher is."

It also comes down to administrative support and communication, Quinn says. "Teachers are going to try to follow the wishes of their administration," she says. So administrators need to be "consistent and clear of what their expectations are for how teachers make (Common Core and cross-curricular learning] come together. Another way administrators can support this is by helping teachers seek out professional development where they need it. Using technology is definitely a benefit, but it's something teachers may not have a high comfort level in doing. They might need professional development in ways to use technology in planning."

WHY CROSS-CURRICULAR IS ESSENTIAL

Even if Common Core didn't exist, there would be plenty of reasons for districts and schools to implement cross-curricular learning. Students will achieve deeper learning if and only if teachers consolidate their efforts and combine relevant content, "opening new spillways of knowledge," rather than plodding along "with isolated instruction and learning," according to blogger Ben Johnson, who wrote an entry on cross-curricular teaching in *Edutopia's* "Deeper Learning" series.

For this to happen, teachers and administrators must understand and accept that deep learning engages the whole student (and the whole teacher), requires enthusiastic partners and intensive preparation, needs assessments that mirror learning, and must be built around collaborative efforts, Johnson says.[6]

Schools and districts should set collaboration into motion at first by simply aligning subject areas, like social studies and English teachers agreeing to use document-based questions that tie across both areas. Then, teachers need to ramp up cooperation. For example, a math and science teacher agree on the best way and time of year to teach about motion, and then help one another do so. Lastly, teachers reach the stage of conceptual collaboration, in which they team teach—for example, an art teacher and a science teacher collaborate on a lesson about wavelengths and the electromagnetic spectrum, and how all that affects pigments and light.

"When professional educators combine their energies and reinforce the same deep learning, the stream of information is clearer for the student, the learning activities are more fluid, and the student's reservoir of knowledge and skills fills faster," Johnson writes. But that leaves one problem: "After years of sipping knowledge, getting students to deeply learn is a daunting challenge."

Years of subject-specific education can leave students with the impression that thou shalt not crossover, agrees Catapano on *TeachHUB*. "Students often think about subjects in rather rigid terms. History is history, science is science, and math is math," he writes. "Can we blame students for this perception? We teachers may be the most culpable for fostering an environment that encourages this disconnect between subjects."

INTERPRETING DATA CAN TEACH MATH, SOCIAL STUDIES—AND OTHER SUBJECTS

How can data and infographics be used to teach mathematics, social studies—and other subjects across the curriculum? *The New York Times* recently ran a top-10 guide on how stock prices, unemployment rates, trends in tuition, and other data can help students and most anyone else make sense of the world.

These include using numbers to tell a story, for example discussing why poverty has fluctuated up and down in the half-century since the War on Poverty was first launched, using data to compare and contrast how median earnings are affected by one's education, extrapolating how the stock price of a company over time could be used to predict its future, digging deeper in examining why SAT scores correlate to family income, or mapping numbers figuring out where poverty rates are the highest, and why.

Using numbers to tell a story certainly brought plenty of positive attention to statistics graduate student Josh Katz, who delved into decade-old data from the Harvard Dialect Survey to create a map of dialects that earned him an internship at *The New York Times,* where his research was turned into the single most popular piece of content on the newspaper's website in 2013, the online quiz and map, "How Y'all, Youse and You Guys Talk."[7]

"As the skills and information students acquire becomes more heavily interrelated, the more structured students' learning is."

Since the world at large does not divide up as neatly, Catapano urges schools and districts to create integrated, cross-curricular instruction. "As the skills and information students acquire becomes more heavily interrelated, the more structured students' learning is," he says. "This more easily allows for the metacognitive transfer of knowledge from one situation to the next and supports students' progressive, scaffolded growth."

Catapano suggests a few different approaches: Do-It Yourself Integration, where one teacher intentionally brings in other subject areas; Team-Teach-It Integration, where two teachers partner to cover the same skills and concepts; and Multidiscipline Integration, where a whole team creates a fully integrated plan, with agreed-upon themes, content, and skills, which could span a single project or the entire year.[8]

Learning across the curriculum has created crossover effects on test scores in places like New York City, where a cohort of 700,000 students in third- through eighth-grade, tracked over eight school years by researchers from Stanford University and the University of Virginia, not only produced higher language arts scores when they had strong language arts teachers but also higher than expected math scores.

"The researchers found that the students of good English language arts teachers had higher than expected math scores in subsequent years," according to a summary of the research published on the Hechinger Report's "Education by the Numbers" blog. "Conversely, good math teachers had only minimal long-term effects on English performance. Their positive effects were more subject specific."

Why this crossover boost occurred is unclear, the researchers say, although perhaps greater reading and writing abilities would help with word problems, for example. "Our findings reinforced the value of investments in student learning in ELA (English language arts)," the researchers write.[9]

HOW CROSS-CURRICULAR IS GETTING DONE

Districts across the country are taking a wide variety of approaches to learning across the curriculum, some prompted by Common Core and some through other inspirations.

Los Angeles area middle-school teacher Heather Wolpert Gawron focuses on reading and writing historical fiction and science fiction as a way to both teach narrative and also fact-based pursuits like history and science. "There's no reason our narratives can't be based in fact," she writes, on the *Edutopia* website. "I still hit on plot and sequencing, figurative language and sensory details, theme, and hooks. After all, any of those can be used in other genres as well."

To ensure that students' work was based on informational research, Wolpert Gawron teaches them how to produce bibliographies of their resources, asks them to think about the importance of the historical time period or scientific breakthrough around which their story is based, and attempts to center small group discussions on the differences between history and historical fiction, and science and science fiction.

"Throughout my narrative unit, the students and I share the responsibility of being experts," she says. "I was able to maintain teaching narrative and all the yummy writing elements that go along with it, and still address the informational requirements of the Common Core standards."[10]

Northville High School in Michigan has adopted a Bill Gates–backed curriculum called the Big History Project that's bundling a number of subjects, most particularly science, with a class that aims to survey the entirety of history, according to the *Detroit Free Press*.

The course, offered in the 2013–14 school year to 137 schools with more than 10,000 students in eight countries, is organized around eight key turning points in history, labeled as thresholds: the Big Bang, Stars Light Up, New Chemical Elements, Earth and the Solar System, Life on Earth, Collective Learning, Agriculture, and the Modern Revolution.

"It's hard for students to see how classes in school connect—how what you learned in ninth-grade history ties to what you are learning in chemistry in twelfth grade. This can serve as a road map," Bob Bain, a University of Michigan School of Education professor involved in designing the curriculum, told the *Free Press*.[11]

At least half of the states have begun using curriculum from the Literacy Design Collaborative aimed to implant writing-oriented tools across the curriculum, allowing "teachers to build content on top of a coherent approach to literacy." The collaborative is a framework that usually starts with a writing prompt that asks students to write about an important issue, such as, "How did the political views of the signers of the Constitution impact the American political system?"

These tasks build up to design principles like distributing responsibility for reading and writing, connecting reading and writing instruction, fostering a response system—and encouraging local choice in a teacher-friendly way. Students are asked to think in ways that will prepare them for success in college and the workplace, while learning to read, analyze and comprehend texts, and then write analytical pieces as the Common Core requires.[12]

In Scotland, Armadale Academy math teacher Rosey Steele used a local educational event called "Money Week" to teach financial literacy in a cross-curricular fashion, using a graphic novel called *SKINT!,* which tells two stories about a pair of young people who face difficult financial choices and invites readers to think about their options.

Steele led a dramatic performance of the graphic novel, actively encouraging the audience to volunteer their thoughts about what calculations made the most sense. Other classes in the academy participated as well: English classes talked about aspects of gambling raised in the story, geography classes explored financial disparities around the world, chemistry classes investigated the alloys used to make coins, and art and design students talked about recreating designer clothing on a budget.

"Cross-curricular work can be tricky for secondaries to manage, but the time and energy that have gone into this project has really enhanced the learning for pupils," writes Chris Leslie of the Scottish Book Trust. "We think it's a great illustration of the power of narrative to teach any subject!"[13]

OTHER RESOURCES ABOUT CROSS-CURRICULAR TEACHING AND LEARNING

Teachers and administrators can choose from many resources to learn more about strategies and programs for learning across the curriculum. Just a handful of them are:

Cross-Curricular Teaching in the Primary School: Planning and Facilitating Imaginative Lessons, Trevor Kerry, Taylor & Francis, October 2010.

Integrating Inquiry Across the Curriculum, Richard H. Audet and Linda K. Jordan, Corwin Press, April 2005.

Why Are School Buses Always Yellow? Teaching for Inquiry, PreK–5, John Barell, SAGE Publications, December 2007.

Cross-Curricular Learning 3-14, Jonathan Barnes, SAGE Publications, April 2011.

Plus, there are numerous multimedia sites such as Google Education, Thinkfinity, Khan Math and Science Videos, the Library of Congress, and a much longer list provided by Eastford (Connecticut) Elementary School.[14]

The Common Core State Standards have helped set off a wave of experimentation throughout schools, districts, and classrooms to weave together cross-curricular instruction, ranging from one teacher combining a couple subjects, to two teachers teaming up, to entire grade levels pooling efforts around a particular theme.

The concept of learning across the curriculum has gained increased urgency and currency from elementary to high school, through efforts large and small—from the 25-state Literacy Design Collaborative aimed at infusing narrative writing across the curriculum, down to efforts in a single Los Angeles area middle school to combine writing with other subjects through the use of historical fiction and science fiction.

These efforts require patience, persistence, and cooperation. "In order for all this to happen in a sustainable way in our schools, deeper learning requires that groups of teachers pool their talents, resources, time, and efforts to maximize coherence, relevance, and connections among the content areas," writes blogger Ben Johnson. "Working together, teachers can help students reacquire the thirst of knowledge they were born with."[15]

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