

Crafting a Vision for Empowered Learning and Teaching

A thought leadership series in partnership with Alan November of November Learning



Table of Contents

Crafting a Vision for Empowered Learning and Teaching:
Beyond the \$1,000 Pencil

Podcast: The Role of the School Leader with Dr. Michael Fullan

Networks for Lifelong Learning: A Tale of Two Students

Podcast: Managing Change with Dr. Rob Evans

How Making Thinking Visible Helps Teachers and Students

Podcast: Moving from Paper to Digital with Dr. Eric Mazur

Inviting Global Perspectives into the Classroom

Podcast: Using Primary Source Documents and Media Across
the Curriculum with Lee Ann Potter



ALAN NOVEMER ON TRANSFORMING EDUCATION:

Crafting a Vision for Empowered Learning and Teaching: Beyond the \$1,000 Pencil

High-speed networks, digital devices, and creative applications are revolutionizing education. Students can be empowered to take their learning to deeper and deeper levels while developing essential skills that will prepare them for success in the 21st century.

For example, our once-isolated classrooms now can connect students to authentic audiences around the world, leading to a deeper understanding of global issues. Powerful yet easy-to-use software tools can empower educators and students alike to create top-quality digital tutorials to contribute and build support for all learners. Our students now have access to primary source materials that would have been beyond the imagination (and limited education budgets) without high-speed networks. We can now support our special education students and have them collaborate where they were once isolated. Virtual reality tools allow us to explore places where a human being could never physically visit, such as the sun or the center of a nucleus. We have technologies that can make abstract concepts accessible and exciting.

Without question, there is a “wow factor” across all disciplines and grade levels. Every day brings the potential for new opportunity to expand and deepen the boundaries of learning. However, adding technology to our campuses does not automatically contribute to improved learning. There is the problem of what we could label, “the \$1,000 pencil – applying new tools to do old work.” Research shows that, unless we redefine the work, we will not be tapping the full power of our emerging technologies. While we must support our educators in learning new tools, the truly creative challenge is to redesign the work and the roles of the learner and educator to tap the potential of our new technologies.

We need leaders who understand how to manage the opportunities of this historic transition. While it is not uncommon to find amazing pioneering educators on any one campus, it is more difficult to find whole campuses that have scaled the innovative practice across their entire faculty. Leadership will make the difference to the rate and distribution of these powerful innovations.

As exciting as these changes are, it is only normal that transformative change will bring some level of resistance from both faculty and students who are used to a traditional design of teaching and learning. One of the most important leadership skills moving forward is to help colleagues manage this shift.

Transforming our education system is not so much an intellectual/intelligence problem as it is an emotional one. For example, many of these emerging technologies represent a shift of control from the educator to the learner. It is not unusual for very gifted educators to feel a sense of professional loss when a new tool, such as the knowledge engine WolframAlpha, allows students to correct their own homework in math, physics, and chemistry and even explore the design of more difficult problems than those assigned.

From a management perspective, it is much easier simply to incorporate technology into doing exactly what has been done before—the same curriculum, same assessments, same schedule, same assignments—than to fundamentally redesign the work and the culture of learning. While there are benefits to automating certain aspects of teaching and learning, we will need leaders who can create professional cultures of innovation where faculty members feel supported in fundamentally redesigning the work to make it more rigorous, creative, and motivating.

We are in a period of constant innovation that will take decades to absorb. What we need to do is correctly define the opportunity, craft a powerful vision, and develop implementation strategies that scale the improvement in increased quality.

Defining the Opportunity

In defining the opportunity that technology brings to learning, there are two broad decision trees for leaders:

- What are we currently doing within our curriculum that we could be doing better by using technology?
- What have we never done before that technology uniquely enables to enhance teaching and learning?

The first decision tree does not require changes to what is learned, but it might change how you approach learning. An example would be the difference between how my two children learned in college. My son, Dan, was able to receive much more support because he could watch lecture videos over and over again, and because he had a social network of fellow students to lean on—and these supports allowed him to learn the same material much more effectively. My daughter didn't receive the same support, having graduated only a few years earlier.

The second decision tree involves redesigning learning to take advantage of design concepts our world of paper could not provide. For example, in Bergen, Norway, students have a much deeper sense of global empathy. The Norwegian teacher is a pioneer in connecting students to journalists, police, prisoners, and native people around the world. Teacher and students fully appreciate that there is no way that a textbook or teacher-designed videos could ever come close to providing the level of depth of critical thinking enabled by global communication. As is too often the norm, this classroom also happens to be the only one in the school where students can gain a sense of developing the critical skill of reasoning based on authentic conversations.

Both decision trees can lead to improved learning. Since adding technology to existing work is fairly straightforward, this article will focus on the definition of transformation. The questions that leaders should ask themselves include:

1. Are we adding unique value to what we are doing as a school or district when using technology?
2. How can we ensure these changes are scaled throughout the organization?

Crafting A New Vision: 'Transformational Six'

To support leaders in crafting a new vision of teaching and learning, I have put together a framework of six key questions that education leaders can use to assess the degree to which technology has brought transformative value to instruction. If you can answer "yes" to any of these six questions, then you're on the right track:

1. Did the assignment build capacity for critical thinking on the web?
2. Did the assignment develop new lines of inquiry?
3. Are there opportunities for students to make their thinking visible?
4. Are there opportunities to broaden the perspective of the conversation with authentic audiences from around the world?
5. Is there an opportunity for students to create a contribution (purposeful work)?
6. Do students own their learning?

Did the assignment build capacity for critical thinking on the web?

Before the Internet, our students accessed sources for learning that had been preselected by a teacher or a librarian. Clearly, the Internet has removed any pretense of control of information. Now that students are choosing sources that have often never been professionally reviewed, it is absolutely vital that we prepare students to make thoughtful decisions about how to select high-quality sources.

We must recognize that with fundamental change there can be unintended consequences. Perhaps our weakest response to the web replacing our libraries as the “go to” source of information for our students is demonstrated by their lack of preparation in understanding how to verify the value of their search results. For example, if you have ever watched a student do research online, you probably noticed that they entered the exact title of their homework assignment as their search query—and then they only looked at the first page of results. Critical thinking and careful evaluation of the reliability of sources can be sorely lacking. Too many of our students believe they know how to use Google effectively. When was the last time any student asked a teacher for help in designing a search? Perhaps more importantly, when was the last time a teacher offered to help? If our students fail at step one—selecting the right information—then they will automatically fail at critical analysis.



“We cannot abrogate our responsibility to prepare our students to be critical thinkers in the Internet Age. We need to teach our students how search engines work and how to design a powerful (and effective) query.”

—Alan November



Here's an example: Suppose the assignment is to write an analysis of the Iranian Hostage Crisis. Here are two very different search designs in Google:

“Iranian Hostage Crisis
site:ac.ir “conquest of the American spy den”

It would be normal for students to type the name of the assignment “Iranian hostage crisis” into Google. This will yield only search results with Western sources if the search is done anywhere in North America. If you ask students to review their results and ask them what is missing, many will not know how to answer this question. They cannot imagine that what is missing from the first page of search results are Iranian sources.

If you challenge students to refine their search strategy to find Iranian sources, most will simply add “Iranian sources” on the back end of their original search. This still will not yield any Iranian sources. But it’s possible to use the advanced search page to select Iran as the source of your content. Or, you can use the Google operator “site” to switch your search to Iranian sources with the two-letter Iranian country code “ir” (site:ir). If you further want to improve the quality of your Iranian sources you could type: site:ac.ir + “conquest of the American spy den” into the search bar. Now you will find sources that are limited to Iranian universities that deal with what the Iranians called that historic event. This last search query will have no overlap with the original search yielding only Western sources. You will be learning about the Iranian point of view. This can lead to a fascinating set of comparison questions.

It should be the responsibility of all teachers to teach the research skills that lead to high-quality comparative searches. In this case, the teacher could have required two sources from Iran. There should have been a review of country codes and the use of the advanced search techniques to generate results from Iran. Finally, the teacher should have spent some time in class challenging the students to think about their search terms—such as by asking: “What did the Iranians call the takeover of the American embassy?” We need leaders who recognize that it is no longer sufficient to teach students how to read books and articles. We must prepare students to be web literate across the curriculum.

Did the assignment develop new lines of inquiry?

With access to massive amounts of information, including primary sources and different points of view from around the world, comes an opportunity to teach students to ask questions we could never ask in the limited world of paper.

Continuing with the example about Iran, if students discovered Iranian points of view about the hostage crisis, they could develop whole new lines of inquiry that would broaden their perspective of these events. For instance: Why did the Iranians refer to the takeover as the “Conquest of the American Spy Den?” Did the goals of the student-initiated revolution against the Shah align with the goals of the religious leaders who became the leaders of the new government?

In an interview I had with Stephan Wolfram, a chief designer of the computational knowledge engine WolframAlpha, he explains that most of the answers to traditional assignments are available online if you know how to find them. What isn’t on the web are the questions. One of the most important skills we can teach our students is how to ask creative, innovative, and even impossible questions. “The new answers are the creative questions,” Wolfram says.



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–Alan November



Are there opportunities to provide our educators with new insights into how their students are thinking?

We now have powerful new tools that can help reveal what students are thinking in ways we couldn’t do before without technology.

These tools also help with self-assessment, which research shows to be one of the most important skills that can improve student achievement. And when students know what their peers were thinking about an assignment, they are more comfortable sharing their ideas in class—which can lead to richer discussions.

Are there opportunities to broaden the perspective of the conversation with authentic audiences from around the world?

As mentioned in the Norwegian example, not only are students gaining valuable perspectives that have served to deepen their learning and help them develop new lines of inquiry, but students can also learn critical global communication skills that will prepare them for future success in anything they do—and they are typically fully engaged in their learning. As one student commented, “I will remember these conversations for the rest of my life.”



Is there an opportunity for students to create a contribution (purposeful work)?

This might be the most difficult quality to build into assignments, but it's no less important. Many teachers I talk to worry about the decline of student focus, but we can immediately address this decline by adding a meaningful purpose to student work. As author Dan Pink notes in his book *Drive*, research shows that purpose is a key motivating factor.

A colleague in Istanbul has her geometry students designing the geometry curriculum for blind students by visiting a local center for the blind and working with the students to understand how to build tactile activities to understand the subject. When her students finished their project, they published it to the web for global access. They know they are potentially making a difference in the lives of thousands of blind children worldwide.

When I interviewed these students in their classroom in Istanbul, many shared with me that they chose to extend their required 40 hours of design work to more than 200 hours. Some students even continue their work the year after their course ended. Their commitment to their work does not depend on an external reward such as grades, but an intrinsic drive based on making a contribution. It will become increasingly essential to give our students access to a global publishing platform to help build more capacity for student driven purpose.

Are students being challenged to take more responsibility to own their learning?

Harvard physics professor Eric Mazur knows how difficult this is from his own experience. He also knows just how incredibly rewarding it can be for students.

Dr. Mazur has figured out there are seven problems that require the knowledge he used to lecture about in his Introduction to Physics course. But instead of giving those lectures, he now gives his students these seven problems to solve in teams. He gives them the necessary background information, along with other resources, and then he inspires them to solve these seven problems on their own. They now do much better on the course's final exam, because they understand at a very deep level how to apply what they have learned. He had to let go of what he once absolutely loved about teaching – giving a brilliant lecture.

Next Steps

Harnessing the power of high-speed networks and other technologies to transform teaching and learning will require that leaders recognize the opportunities of both automating existing practices and creating new opportunities for learning that we could never do before. As more knowledge becomes available online, we are moving to a new reality where the added value of an educator will be measured less by their ability to transfer their knowledge and more by their ability to inspire students to continuously expand their own boundaries of learning.

As we teach students the lifelong skills of validating content, connecting globally, and applying their knowledge to add value to the world, educators will become more important than ever. The essential leadership skill will be to help manage this transition to redefine the work of both educator and student. It is an amazing time to be in education!



Cisco Customer Spotlight: Watkins Glen Central School District

At Watkins Glen Central School District, bus rides between home and school can take up to 40 minutes each way, with sports events and field trips extending travel time to two hours and more. To make sure no students were disadvantaged due to where they lived or what they were participating in, the school wanted to help ensure students could use the transportation time productively and extend its digital campus beyond the classroom.

Read Case Study >



DR. MICHAEL FULLAN AND ALAN NOVEMBER

Podcast: The Role of the School Leader

This podcast covers select concepts of the role of the school leader in building cultures that support innovation.



Dr. Michael Fullan is an international expert on leadership and managing change. His work is research based across networks of schools with serious results.

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ALAN NOVEMER ON DIGITAL CONNECTIONS:

Networks for Lifelong Learning: A Tale of Two Students

We are in the midst of a historic transition in education, in which we are providing more options and flexibility in creating learning cultures that significantly raise the expectations of what our students can accomplish. We now can effectively support students who traditionally have not succeeded. You have heard it before; learning can be available anywhere, securely on any device, in any format, and potentially connected to anybody 24×7.

So, what does this really mean for leaders who are responsible for setting the vision for their campuses? We now can rethink the allocation of physical space and how courses are scheduled to support various students' learning styles. What is really exciting is the sense of student empowerment that can emerge from a highly flexible learning design, enabled by a robust digital campus. For example, we can tap the natural behavior of young people who we know are social with powerful community-based and collaborative tools that can create a deeper sense of shared learning. Traditional boundaries, such as the end of the semester, are giving way to continuous social interaction and support of lifelong learning. It is an exciting time to be in education.

Where to begin in leading this shift? There are many possible first steps. This article focuses on two broad areas of digital design that can provide the foundation for an empowered culture of learning:

- Multimedia content
- Online communities of social interaction with classmates and professors

I have experienced this transformative shift of expanding the boundaries of learning with my own college-age children. My daughter, Jessica, graduated from university in 2010 and my son, Dan, will graduate in 2017. They both will earn equivalent grades at two different but highly competitive universities. How they studied, how they were supported in their learning, and how they interacted with classmates and professors represent two different worlds. Both of my children are convinced that Dan, the younger sibling, will be much better prepared for the world of work because of this transformation.

Access to Content

My daughter had a textbook for every class, often written by the professor as many as ten years earlier. At that time, these expensive books cost \$160. Multiply that by 32, the number of courses she had to take to graduate, and you're talking about more than \$5,000 in additional expenses.

Danny, on the other hand, will not buy a single textbook in four years. Essentially, all of the learning resources he has needed were accessed online. The biggest change is that his professors have organized resources from all over the world, whether they created the content themselves or not. One of Danny's professors shared with me that one of the biggest mistakes he made when he first created his online community was to only include his "stuff."

"I realized that I did not have to invent everything for my students as I used to do," this professor told me. "Indeed, I can be a model for how my students can access resources from around the world."

In many ways, Danny will be better prepared for the world of work, because he was required to develop individual criteria to evaluate information from multiple perspectives. The difference between his experience and Jessica's is not in learning how to manage content in the digital age, but in the different opportunities he has had to develop empathy and judgment. As Jessica reflects, "Whereas I was handed a singular viewpoint from lectures based on one professor's ideas, my brother had to learn to integrate many perspectives in considering how to solve a problem." Danny added: "I was taught to find the best possible resources. I still do that now that I'm no longer in the class."

One simple advantage for Danny was the rewind button that Jessica never got to use. Watching online videos became a routine for Danny, as many of his classes had a full library of video lectures, tutorials, and explanations of assignments. He would review lectures and check his notes after he attended class. Re-watching the recorded lectures from his classes proved extremely helpful when he was doing his homework or preparing for an exam. The full-text search capability built into the videos, from solutions such as VBrick, allowed Danny to zoom immediately to the sections he needed to review. He said he came to rely on the video library, noting: "I just missed so much when I was taking notes in class."

When I asked him to compare university to his middle and high school experience, Danny reflected, "When I was in school, if you could not follow the textbook, you were in trouble. Textbooks often were not engaging, and they did not provide the kind of support that I needed. Now, I have multiple resources from around the world. One of my professors explains why he has so many different resources this way on his website: This particular set of resources is how I understand best. You might not learn in the same way as I do. That is why I am pointing you to many resources from around the world. You will have to choose what works best for you." He sums up: "I was taught how to learn how to learn."

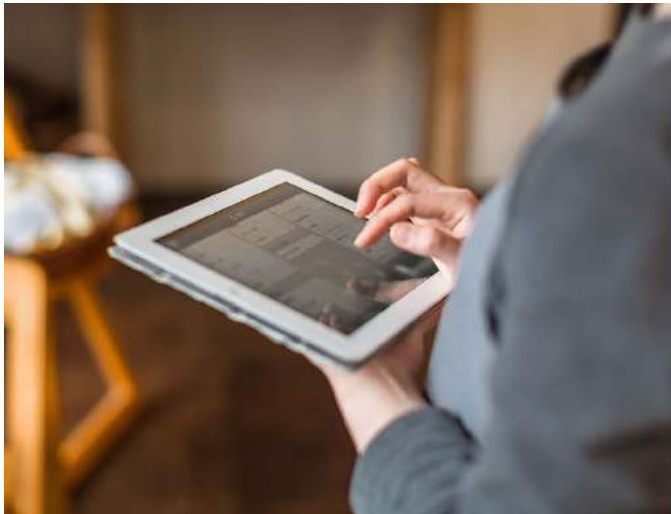
In comparison, some of Jessica's professors handed her printouts of PowerPoint lectures. According to my daughter, they thought they were ahead of the curve. Her university also had a policy whereby you could sign up for notes transcribed by a classmate if you had a learning disability. In Danny's classes, any student could control the speed of the video playback for the entire lecture. Given the agility of the technology, video playback was available immediately after each class. Compare the special services for a few on Jessica's campus to the total control of all class content by every student on Danny's campus. Moreover, Danny had access through all three of his devices: phone, laptop, and iPad. He often would play back the video on his phone while he rode the bus home.

In his more sophisticated classes, video also was used to help Danny and his classmates understand the requirements of an assignment. The content would include videos explaining, "This is what we are looking for. You should be thinking about this. We are not looking for this." Clarity of expectations can take pressure off of the professor, who no longer has to answer the same questions over and over again: "What do I need to do to get an A?"

From Danny's perspective, watching these video walkthroughs was the equivalent of sitting down one-on-one with the professor. He had a crystal-clear sense of exactly how to think about each problem. The teaching assistants who worked with the video crews thought through all of the questions that students might have. Students literally had no excuses for being confused about the direction of the assignments. Clarity of design did not limit students to a lock-step approach, however. Indeed, the confidence of clarity would empower students to go beyond the expectations of the professor.

As one of Danny's professors, Dr. David Malan, commented: "I only know that I have added real value to my students when they are inspired to go beyond my expectations." As his father, I can attest to how "on fire" Danny was to conquer his assignments to the very best of his ability. There are no limits with this kind of learning.

I asked Danny if he thought that video libraries could have helped him in middle and high school. "Sometimes in middle and high school, I would have no idea what the teacher wanted," he replied. "Video access would have saved me from asking embarrassing questions in front of my classmates. Often, the potential for embarrassment would prevent me (and my friends) from asking for help at all."



"I realized that I did not have to invent everything for my students as I used to do. Indeed, I can be a model for how my students can access resources from around the world."

-Higher Education Professor



Social Tools and Online Communities

When Danny's video tools were still not enough to make concepts clear, he had the option of shooting off an email to his online community of peers, his professor, or his section leader for specific help. Many of his courses used the university-sanctioned learning management system, Canvas. Danny was able to access every imaginable learning resource (text, video, documents, slide decks), securely, from every possible device, at all hours of the day and from every imaginable location.

And Learning Management Systems aren't the only way that students communicate today. Online meeting services like WebEx allow students to meet virtually with peers, or the professor. And as a forum for student conversations, sharing content and meeting instantly, services like Spark are growing in popularity.

"That's what helped me get through my classes," he acknowledged. "In fact, in one course, many of the students felt the professor was not providing us what we needed. Students rallied and we built our own online community. It is just automatic and natural for me to engage online with my classmates to support one another."

What really impresses me is Danny's sense of responsibility to help his peers in an online community. Danny matter-of-factly points out: "If I see that classmates are struggling with something, it is really easy for me to jump in and help out. And I benefit by doing this as well. When I am helping a classmate with a problem, I have to really think through the material in order to write out an explanation or shoot them a screencast."

Danny often chooses to ask his classmates for help before asking his professor. For many students, this peer-to-peer tutoring can be the most effective way to learn. Why would students choose to ask a classmate for help when they have access to an instructor's office hours? It is possible that some educators suffer from the "curse of knowledge." This happens when an expert's knowledge creates a blind spot in understanding what a new learner is missing in his or her background knowledge to comprehend a lesson. As high school student and award-winning video tutorial pioneer Shilpa Yarlagada observes, "Teachers know the material so well that they sometimes forget how to explain to students who are learning for the very first time. In these cases, I wish I could just turn to a friend who is in the class with me and (who) understood the material. Because they recently learned, they (are) in the very best position to explain it to me."

Professor Eric Mazur, Dean of Applied Physics at Harvard University and a very early pioneer in building online communities, learned that students would ask more questions in an online community than in a face-to-face class. He had collected thousands of questions online from his Introduction to Physics class. When I asked him if he noticed any pattern from the questions that would be useful to him as an educator, he observed: “In more than 25 years of teaching, I had never heard of 80 percent of them during class. I never realized the extent to which my students were struggling with misconceptions and gaps in their basic knowledge of science.” Professors and teachers certainly know their subject area. What they might not know are their students’ questions.

What fascinates me is that Dan continues to be actively connected to many former classmates and professors across various social media channels. He explains, “A few professors have Twitter, LinkedIn, or Facebook. Many professors will not ‘friend’ students during the semester but will after the course ends. It’s kind of cool when you have access to their thinking without worrying about handing in your assignments. They all have disclaimers that their personal views do not reflect the school view. You definitely get to know them much better, including their interests. One professor is a horror movie fan. Another is a Dungeons and Dragons guy. I’m in touch with one of my former professors via email about design ideas I have for various projects. I have connected with past professors as a resource for real-world problems. I am also interested in some of my professor’s ongoing research—really interesting stuff.”

In some of Dan’s classes, the students were required to use Twitter. “I still have the Twitter list with my classmates,” he said. “I continue to follow all of them over Twitter. It is effortless for me to stay in touch. Professor Malan invites all his former students to the CS50 Fair, where students present their final computer science projects. CS50 is notorious for involving past students via social media. One professor reached out to me across social media to invite me for a paid research project based on my prior academic work in her course. It was wonderful.”

Unlike Jessica, Danny will graduate with a vibrant professional network of active classmates and professors. This network is already helping Danny line up job interviews and shared knowledge about how to launch his career. Dan’s network will continue to be a living, vibrant, and expanding community of mutual support that will propel his lifelong learning. Jessica will make sure that the next university she chooses for graduate school will provide the same opportunities.

Here are five guidelines for leaders who are planning to maximize the investment in network technologies to improve teaching and learning:

- Provide all students with immediate access to subject content in all formats (full text, video, audio)
- Support a community of learners who can continuously help one another
- Provide educators with insights into how students are thinking in online communities
- Encourage educators to teach students to “learn how to learn”
- Allow students to continue to tap their campus networks as a lifelong resource



Cisco Customer Spotlight: University of León

The University of León masters digital disruption, creating a connected learning environment where students can thrive and excel. .

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DR. ROB EVANS AND ALAN NOVEMBER

Podcast: Managing Change and Sustaining Success



Dr. Rob Evans is a clinical and organizational psychologist and the Executive Director of The Human Relations Service in Wellesley, Massachusetts. A former high school and pre-school teacher, and for many years a child and family therapist, he has consulted in more than 1,700 schools throughout the U.S. and internationally, working with teachers, administrators, and boards, and he speaks widely at educational conferences.

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ALAN NOVEMER ON DIGITAL TOOLS:

How Making Thinking Visible Helps Teachers and Students

One category of digital tools, making thinking visible, can give students a higher level of confidence to ask questions when they need help or share their opinions and ideas with the rest of the class – leading to more thoughtful discussions. These same tools inform educators about how to plan for much more meaningful lessons.

In the 1980s coming of age movie *Ferris Bueller's Day Off*, one of the funniest scenes I remember (perhaps because I was a social studies teacher at the time) is the high school economics class with Ben Stein as the teacher. His famous monotone repetitive question to the entire class of “Anyone?” yields zero interest in response. He tries to explain the Hawley Smoot Tariff Bill, “which, anyone? Raised or lowered tariffs? Did it work? Anyone? Anyone know the effects?”

Of course, the comedic effect is that not one student was willing to acknowledge what teacher Stein was conveying about the Hawley Smoot Tariff Bill. He seems to accept his fate of a complete lack of student response without any concern or worry. Undeterred by blank glassy-eyed student stares, he seamlessly moves on to his endless unenthusiastic nod for class participation, “Anyone?” One student is drooling on his desk while he sleeps through Stein’s monotone. Stein’s character remains oblivious.

While that scene is an extreme caricature of a classroom, a friend of mine who was teaching physics at an Ivy League School in the 1980s only had about 10% of student engagement when he would ask students in his lecture classes of more than 150 for their input. Similar to the movie, he used to see his job as conveying his knowledge to his students as he tried to hold their attention. Today, he is still teaching – but in a very different culture supported by digital tools and new processes. It is not an exaggeration to say that all of his students are engaged almost all of the time. Students are actively defending their views of the application of physics, they are writing application questions, they are explaining concepts to peers in a new model of assessment.

Throughout all of this energy and excitement, this professor is learning more about how his students think and reason and learn. He has greater insights into their misconceptions and their ability to use their imaginations to extend beyond his expectations. He talks less and listens more.

Acquisition of knowledge has improved. Enjoyment for student and educator is up. Use of time, the most precious commodity of learning and teaching, is much more efficient.

What the country needs is a high-tech version of Ferris Bueller's Day Off to show the power of how technology can transform the culture of learning to be the exact opposite of the boring impact of Stein's response to "Anyone?" In the original movie, the teacher owned the learning. In the new high-tech version, there has been a shift to students owning their learning. That is the revolution – a change in the culture and control of information in the classroom. The new high-tech version of the movie will not be a comedy. It will be an adventure story of how exciting learning is. The pathetic Ben Stein character will be replaced by a romantic hero who seamlessly ignites students' passion for learning.

In reality, transforming the culture of the classroom can be complicated and hard work and can take many steps. Pioneering schools and universities are moving to support a vision that students can tap their native creativity and curiosity, and their proclivity to social engagement with peers, to manage more of their own learning. One of the most difficult aspects of creating a culture of high-performing engagement is managing the shift of control from the educator to the learner. Another level of potential resistance is creating a team-based classroom culture from individual students working for their own grades to teams of students working to help one another.

Frankly, letting go of control can be very scary for professors and teachers who traditionally have been highly valued for their conductor-like ability to control the flow of knowledge in a classroom where every student receives the same content at the same time. The trick is to strike a balance between empowering students to own more of their own learning while the teacher directs the flow of learning. In this new balance, the role of the educators is more important than ever. All educators do not agree that technology has made their lives easier. What we need is to give them tools that can ease the workload while improving results.

Where to begin? I have selected two powerful digital tools that are very easy to use. Each one reveals how students are thinking with different patterns. Both are free – and both can support student engagement while better providing educators with insights into patterns of student thinking.

The first example is [Prism](#), developed by a team of students at the University of Virginia. When you see Prism in action, it becomes immediately clear why it's so effective with inviting students to engage in debate. Very little technical staff development is needed; all you have to know is how to cut and paste text and fill out a form. It is based on a design concept of digitally overlaying the interpretation of how an entire class interprets text onto three screens. Each screen turns the text into a different color. Each color represents a concept the teacher has chosen for interpretation. It is formative assessment at its very best, leading to a deeper understanding of how a whole class is thinking. The feedback is immediate.

Let me tell you about the details of the first time I watched a class come alive because of the creative use of Prism by an English teacher. The teacher was giving a lesson on Shakespeare. Before she introduced her students to a Prism exercise, she was asking the class questions about the play they were reading, such as which parts they thought were hardest to understand, most insightful, or most open to interpretation. Only a few students raised their hands to answer – and it was always the same few students who did.

Then, the teacher had her students break into groups of two. Each group was asked to read the same section of the play that was uploaded to Prism. Within Prism, the students had to reach agreement about which passages to highlight with the three digital colored highlighters according to the code filled in by the teacher. Red was for the most difficult words, green represented open to interpretation, and blue indicated major insights. (The teacher could have chosen any concept to be coded to a color, such as use of evidence or best use of inference.) As students began to highlight, the pattern of the whole class' thinking began to be revealed as the font size of each word in the text changed as a function of how many teams highlighted various sections of the text. It was like watching a faded blurry map come into clear sharp focus! When the class was finished reading and highlighting the teacher simply clicked on one digital color at a time to reveal the patterns. It was easy and the impact on student engagement was immediate.

The whole class could see the pattern of thinking of their peers. When the teacher asked the class again: "Who would like to explain which passages they thought were the most insightful, and why?" This time, hands shot up everywhere. The difference in the students' response was like night and day.

At that point, nearly every student was engaged in the lesson, and there was a high degree of enthusiasm. It was fascinating to watch. The bell rang, and the students didn't want to leave. They were still debating with each other – and these were the same students who, moments earlier, wouldn't talk or raise their hands.

What had changed in such a short amount of time to create the kind of rich discussion and engaged learning environment that many teachers only dream about?

When I asked the students to explain why they had become much more engaged, one girl noted that at the beginning of class she was reluctant to raise her hand, because she didn't know what the other students were thinking. She didn't feel safe in responding, because she might be mocked for saying something stupid – or something really smart. But once the class used Prism, she knew what other students were thinking, and she could see that she wasn't alone in thinking the way she did – and that made it safe for her to participate in the class discussion. I need to mention that all of the students' highlights are anonymous. It is this anonymity that gives the students the confidence to take risks.

The teacher was listening to this debriefing, and she was nodding. She understood the power of a tool like Prism to transform her class into a much more engaging, risk-taking, and intellectually curious environment.



“We often think of making students' thinking visible as a strategy to help teachers. When teachers have more insight into what their students know (or don't know), they can adjust their lessons to make sure everyone understands the material. But making the thinking visible also helps students.”

-Alan November



When students can see how their ideas fit in with the rest of the group, they feel more comfortable in sharing those ideas – which leads to better and more open conversations. As one student commented, “For the first time, I realized that I was not the only one who had difficulty understanding one aspect of the reading. That gave me the confidence to ask the teacher for help.”

Teachers also can use Prism as a self-assessment tool. Students can upload their writing to the platform and highlight certain elements the teacher might request, such as inferences, supporting evidence, or places they could use help. The teacher benefits from seeing whether students understand these concepts, and the students benefit from reflecting on the quality of their work before they turn it in.

Research clearly supports the value of self-assessment, because it helps students become independent learners. For instance, researcher John Hattie has pored over nearly 1,200 educational studies from around the world to identify the factors that most strongly correlate with student success. Of the 195 independent variables he has identified, [self-assessment ranks third](#) on his list in terms of importance—and it's the single most effective learning strategy that students can use for themselves.

Prism is just one example of a category of tools, of making thinking visible, that can help teachers, professors, and students to understand patterns of understanding that would not be possible in a world limited to paper. In the hands of a thoughtful educator, the patterns revealed by these tools can lead to richer debate and a deeper understanding of concepts. Educators can immediately see where there is a complete absence of highlights. These tools can help inform educators with much finer detail of what to cover next.

Another tool, [Verso](#), is not limited to text but enables the educator to send out any content, photo, video, or text. It helps teachers encourage their students to think more deeply by asking open-ended, thought-provoking questions that students can answer either during class time or on their own. Only the teacher can see who left each comment, and this anonymity allows students to feel comfortable responding freely to the teacher's questions and their peers' responses.

One of the challenges with online discussion boards is eliciting original thinking from all students. If someone is the 10th student adding to the discussion, it's hard to know how much he or she has been influenced by the first nine commenters. Or, students might be discouraged from giving an authentic response by what they've read from the first nine. With Verso, students don't see each other's responses until they submit their own – which solves this problem nicely.

Here's how it works: Teachers create an activity by linking to a video or a document they want students to reflect on, then ask them a question about it – something that will provoke a good discussion. There's a space in the assignment for teachers to model the kinds of responses they'd like to see from students, to make sure students understand the depth of thought that is required of them. Then, teachers assign the activity to their class.

Students can reply to and build on each other's ideas, and they can reward others' responses with "likes." Teachers also can group students based on their responses and encourage them to probe each other's ideas further, thereby taking the learning deeper.



"In a traditional class discussion, pursuing a line of inquiry with one student means you have to ignore the other students. You can only get to one or two levels of discussion. But with Verso, you can put kids in groups and then have them respond to each other – which can be quite powerful."

-Alan November



For example, you can challenge a subgroup of three students to try to convince the other two that their initial response is the most logical.

Verso is a great tool for helping students learn to ask more insightful questions and dealing with more difficult material. For instance, you could have students in history read this primary source such as [this letter](#) to President Kennedy where the author expresses deep disappointment in the new president's position on civil rights. Without telling students anything else about the letter, you could ask them to submit whatever questions they have about it through Verso.

Many students start out by asking basic factual questions, such as: "Who wrote the letter?" But those are closed questions; they don't lead to any deeper thinking or debate. As the teacher encourages the class to ask hypothetical questions or divergent questions, you can see an explosion of creativity as the questions become more complex. As a teacher, you can use Verso to teach students to develop a deeper line of enquiry. The anonymity provides the safety for the students to take a risk and the teacher mode allows the teachers to see what each student is thinking. It is the very best of both worlds.

These learning tools represent a small part of what can happen when powerful technologies are put in the hands of skilled teachers and are used to transform instruction. However, enabling the flow of critical information generated by learning tools isn't made possible solely by the educators. The learning tools and technologies used to engage students are also extremely dependent on having a robust network. These web and application-based tools are being used by all students who are bringing their own devices onto the campus. As more educators realize how easy it is to tap the power of apps that make thinking visible, to save time and to add value to academic achievement, demand for access points and bandwidth will increase.



DR. ERIC MAZUR AND ALAN NOVEMBER

Podcast: Moving from Paper to Digital



Dr. Eric Mazur is the Balkanski Professor of Physics and Applied Physics and Dean of Applied Physics at Harvard University, Member of the Faculty of Education at the Harvard Graduate School of Education, and President of the Optical Society.

Mazur is a prominent physicist known for his contributions in nanophotonics, an internationally recognized educational innovator, and a sought-after speaker. In education he is widely known for his work on Peer Instruction, an interactive teaching method aimed at engaging students in the classroom and beyond.

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ALAN NOVEMER ON FOSTERING GLOBAL CONNECTIONS:

Inviting Global Perspectives into the Classroom

As our schools and universities prepare students to make a contribution to the world, it is important to benchmark the emerging critical skills they will need to solve increasingly complex problems. As we accelerate the speed of moving data and communications around the world, one strategic skill emerges that we traditionally have not taught: global empathy.

My own introduction to how valued this skill is came from an interview I had with the CEO of one of the largest banks in the world. He did not hesitate when I asked him, “Which skill is the most important one where you see a shortage in the workforce?” His answer: global empathy. He went on to explain why. “Global empathy,” he said, “is the ability to understand and respect different points of view. We invest in complicated projects across the globe. The shortage we see is hiring people who understand how to value the various points of view on a team who are digitally connected from all over the world. We can have engineers, bankers, architects, researchers, designers, marketing people, and more—all working on the same project who live and operate from dozens of countries.”

The executive continued: “It’s not hard to find employees who have high test scores. What is hard to find are employees who can effectively contribute to teamwork and be sensitive to the needs of people from other cultures, religions, and regions, who might have very different perspectives from their own.”

The boundaries of relationships prescribed by our traditional classrooms typically limit students to conversations with peers sitting next to them. In many classrooms, this means that when we assign work that challenges students to understand geographically diverse topics, or different points of view on a local topic, there is a complete lack of authentic global empathy. If the global banker is correct, we must tap our investment in Internet connections to our classrooms and provide our students with meaningful experiences to develop a sense of working with the world. It is no longer sufficient to earn high test scores without global empathy.

Fortunately, technology makes it extremely easy for today’s students to become globally aware. From web and video conferencing platforms, to social media channels and collaborative software (like Cisco Spark and WebEx), educators now have incredibly powerful tools to connect their students instantly with classrooms and subject-matter experts from around the world—a development that has profound implications for education.

My consulting work takes me to schools all over the world, and I regret to say that many educators I've met still are not taking full advantage of this ability. Some teachers might believe there is not enough time in the school day for them to get through everything they have to cover in the curriculum, while also connecting their students with others around the globe; others might fear the loss of control that comes with opening their classrooms to the world at large.

What if you could cover the curriculum and leverage authentic global connections to motivate students to work harder on required content and develop global empathy? The teachers I have met whose students are globally connected have witnessed a dramatic increase in student engagement. Globally connected classrooms do not have to give up focus on basic skills such as reading and writing in elementary school or subject content in secondary school. Not only are their students learning essential skills that will prepare them for success in work and life, but these students are more fully engaged in their learning. They're also gaining rich experiences that will stay with them long after they have handed in their final exam.

Here are some of the key aspects of global empathy:

- Listening. This is such a vital skill. By actively listening, students are showing that they value the ideas of others.
- Balancing different points of view. This requires careful and critical thinking. Students should be able to identify biases, assumptions, and whether some arguments are more valid than others.
- Developing lines of inquiry. Learning how to ask good questions helps deepen students' understanding. Effective questions give students further insight into how their peers see the world—and why.
- Publishing reflections for authentic feedback. Students should be given the time to reflect on what they have learned from others, and how this has affected their own way of thinking. By sharing these thoughts online, students can get real, authentic feedback from their peers and others around the world—which is much more meaningful than just getting a grade from their teacher.



“Students need to connect with others around the world. We need to be giving them the tools to understand different points of view. Plus, they love to debate their peers.”

–Terje Pedersen



Understanding Different Points of View

Bergen, Norway: Terje Pedersen's students have authentic conversations across the curriculum from North America, Europe, Asia, and Africa. His students have come to expect and value that they will be challenged to think, reflect, and reconcile various points of view.

Terje teaches English and social studies to what would be the equivalent of high school freshmen in Bergen, Norway. He taps various social networks to challenge his students to learn more deeply about topics in the curriculum.

His global network includes teachers from around the world who are willing to open their classrooms to his students, a policeman in Chicago, a state senator from Brooklyn, New York, grandparents in Russia, survivors of Apartheid in South Africa, a teen behind bars in the U.S., and students in Australia who are studying Aborigine culture.

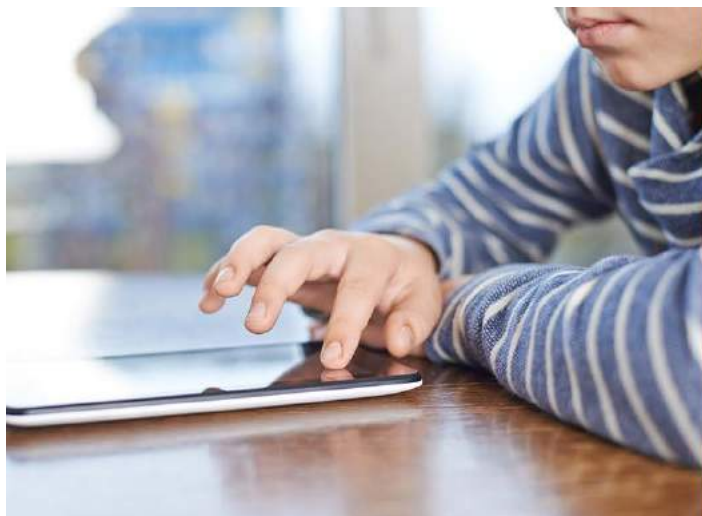
“Students need to connect with others around the world,” he said. “We need to be giving them the tools to understand different points of view. Plus, they love to debate their peers.”

Making these global connections not only builds empathy among his students; it also helps them understand there are multiple perspectives about the issues they are learning. When his students are studying the Cold War, for instance, Terje has them connect with students in Russia to hear Russian points of view about defining events such as the Cuban Missile Crisis. Each class shared their interviews with their grandparents about how they felt growing up during the Cold War. This personal connection to a historic event gave his students a much deeper sense of what that period meant to people on both sides of the Iron Curtain. Differing facts about what happened and how it happened led his students to learn to think critically, ask probing questions, and challenge their assumptions—all while taking their learning deeper.

“We spend very little time memorizing dates,” Terje said about his classroom. “We need to be going more in-depth. I’m not going to give my students an assignment where they can just copy an answer from Wikipedia or a textbook.”

In talking with their peers from around the world, Terje’s students are learning how to be culturally sensitive, and they’re developing important communication skills. In one project, his students connected with an American teen serving time in a juvenile prison. The American’s story moved them deeply, and around Christmas they sent him letters to cheer him up.

Making global connections is a much more motivating way for students to learn than reading from a textbook, Terje said—and his students agree. “This makes school more motivating” one girl told me. “We look forward to talking to other people. We get to learn in more ways than just reading information.”



“It was such a learning experience for them... They were able to empathize with someone far away because of this connection.”

—Kathy Cassidy



Not Just for Older Students

Moose Jaw, Saskatchewan: Connecting with others around the world isn’t just an effective learning strategy for older students. Canadian teacher Kathy Cassidy has her first graders in Moose Jaw, Saskatchewan connect with students around the world.

“We follow other classrooms because it’s a way for kids to improve their reading and writing,” Kathy said.

She noted that her students are far more engaged when they are reading something that was written specifically for them by children their own age from around the world.

They are also naturally curious to learn more about their new global friends: where the students live, what their school is like, and what they like to do. As Kathy's students are practicing their reading skills, they're also learning geography, how to ask questions, and how to be globally aware.

One day, her students came to school worried. They had heard there was a flood in Brisbane, Australia, which was where one of the classes they had met on Twitter was located. Kathy contacted her colleague in Australia, who assured them the students were safe—and she sent pictures, maps, and videos of the flooding.

"My kids were fascinated that there were sharks in the water," Kathy said, noting that Moose Jaw is far from any ocean. "It was such a learning experience for them. And it all started because my kids thought the same way about these students in Brisbane as they do about the kids next door. They were able to empathize with someone far away because of this connection."

If Kathy didn't have her global connections, she said she would lose opportunities for what she calls "serendipitous learning." For instance, her students saw a tweet from a class in British Columbia referring to "samn eggs." "What are those?" they wondered. In tweeting back and forth, they learned the B.C. students were referring to salmon eggs. Kathy's students knew what salmon were, but they hadn't realized that fish start out as eggs. That triggered a discussion about which types of animals come from eggs and which give birth to their young.

Often, Kathy and her students will see ideas from different classrooms for projects they'd like to try themselves. "We saw kids who were doing these Lego challenges, like: Can you make something out of Legos that floats?" she explained. "My kids were thrilled by this. They tried it themselves, and that led to conversations about why some designs float when others don't. Ordinarily, we would not cover buoyancy. Our connections are leading us to expand our wonderment of the world."

Because her students are young, she takes precautions in how they use social media. For instance, they aren't allowed to tweet a message themselves without showing her first—and she previews the account to make sure new posts are appropriate. "If someone tweeted something inappropriate to us, I would see that first, and I would block that user," she noted. "But since I've been using Twitter in my classroom, I've never had that happen."

Besides following other classes on Twitter, her students connect with "reading buddies" from around the world through real-time video to practice shared reading, and they also maintain digital portfolios of their work. These first graders from remote Moose Jaw are learning how to have a global voice early on in their lives, which is empowering them to become lifelong global learners.

"One day, one of my students was reading a book he had written about snowmen," Kathy relayed. "When he asked his reading buddy in Brisbane if she had any questions, the Australian girl asked, 'Why aren't there any snow women in your story?' Of course, none of our students in Moose Jaw would ask that question. These relationships provide our students with the opportunity to reflect on their work in new ways and from different perspectives. That's priceless." Both Terje and Kathy recommend tapping social networks to connect to authentic global relationships. Kathy happens to use Twitter to connect to other first-grade classrooms around the world. Terje uses Facebook, LinkedIn, and Twitter to meet his contacts.

Overcoming Objections

A common concern among many teachers is that they don't have the time to make global connections in their classrooms, because they're too busy covering the required curriculum. But everything that Terje and Kathy do online is related to their curriculum goals.

"All of what we do is curriculum-based," Kathy said. "It's just a different way of doing it. Instead of reading on chart paper, we read on Twitter. I'm modeling reading and writing for my students in a digital way instead, and I'm getting all of these side benefits as well: teaching them to be good digital citizens, teaching them geography skills, and teaching them to have empathy for others around the world."

Making global connections also requires teachers to let go of some degree of control. When Terje had his students connect with an incarcerated American teen, he had no idea where the conversation would lead. But Terje said it's well worth the risk—and his students agree as well.

I had the privilege of talking with three of Terje's students about how they have benefitted from the global connections they have made, and they were remarkably self-aware of their own learning.

"You learn that there are different opinions than what you might find online," one boy said, adding that teachers shouldn't be afraid of trying something new. While making global connections requires more work on the front end—teachers have to find classes to connect with, and students have to prepare questions they will ask—this extra work definitely pays off."

"I remember more from these conversations," another boy said. The lessons he has learned from making global connections are "something you will carry with you for the rest of your life."

Action Steps:

If you're ready to inspire global connectedness in your classroom, here are three simple ways to start:

1. Search in Google for "Twitter second grade" and you can begin to search for partner teachers by grade. Find Twitter accounts you want to follow to build your global network.
2. Use epals' membership database to contact teachers by country around the world.
3. Head to Global School Net to search for scheduled projects designed by educators around the world.



Cisco Customer Spotlight: New Jersey's Woodland Elementary School

What started as a way to connect ten-year-old Peyton to her classroom while receiving cancer treatments turned into a new learning tool for her entire class. Using Cisco's collaboration technology, Woodland Elementary School is able to virtually communicate with peers and experts around the world, bringing them uncharted global experiences.

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LEE ANN POTTER AND ALAN NOVEMBER

Podcast: Using Primary Source Documents and Media Across the Curriculum



Lee Ann Potter is the Director of Education Outreach for the Library of Congress in Washington, D.C.

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